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Behavioral Health Hospitalizations Paid Only by MassHealth for Adult Fee-for-Service Members

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Executive Summary

This is the second in a series of analyses of behavioral health hospitalizations being conducted by the Center for Health Policy and Research (CHPR) at the University of Massachusetts Medical School, in collaboration with the MassHealth Quality Office and the MassHealth Office of Behavioral Health. The first report, *Hospitalizations for Behavioral Health Disorders in Adult MassHealth Fee-for-Service Members, 2010*, examined hospitalizations that MassHealth paid either as a secondary payer or as the only payer. The current report describes behavioral health hospitalizations paid only by MassHealth for fee-for-service (FFS) members, examines factors associated with long length of stay (LOS) and hospital readmission, and compares behavioral health hospitalizations for MassHealth FFS, managed care organization (MCO) and Primary Care Clinician Plan (PCCP) members. These reports will be used to assist in the planning of a utilization management program for the FFS plan's behavioral health inpatient services.

Findings from the current report show that, although the FFS behavioral health hospitalization rate in FY 2007 (10.4 hospitalizations per 1,000 FFS members) was higher than in subsequent years, the rate remained stable at approximately 8 hospitalizations from FY2008 to 2010. However, the average LOS decreased from 17.0 days in FY 2007 to 14.5 days in FY 2010. During the same time period, the number of inpatient days per patient decreased from 26.1 days to 22.1 days. The 30-day readmission rate decreased slightly from 17.6% to 16.0%. Inflation-adjusted MassHealth payments for behavioral health hospitalizations paid only by MassHealth for FFS members decreased from \$27 million in FY 2007 to \$24 million in FY 2010.

Nearly 20% of behavioral health hospitalizations in FFS members aged 19 to 64 were longer than 14 days, which was higher than the 10% rate in MCO and PCCP members. After adjusting for member characteristics and disease burden, LOS for FFS members was 1 to 2.5 days longer than that for MCO and PCCP members for all diagnoses, except depressive disorders.

Additionally, approximately a quarter of FFS members aged 19 to 64 with behavioral health hospitalizations in FY 2010 experienced two or more hospitalizations, and the 30-day hospital readmission rate was 17%. The adjusted odds of being readmitted within 30 days for PCCP members were two to three times higher than for FFS members, except for those being hospitalized for schizophrenia initially where the two groups were similar. In contrast, the adjusted odds of 30-day readmission for MCO members were similar to FFS members.

Several factors were associated with increased odds of having long LOS for FFS members. These include older age, being dually eligible for Medicare and Medicaid, being affiliated with DMH, and being hospitalized for schizophrenia or dementia. Also, younger members and members with co-occurring mental illness and SUD had higher odds of 30-day readmission.

A significant proportion of FFS behavioral health hospitalizations had long stays, and hospital readmission was common. Utilization management could focus on people at high risk of long LOS and readmission. Utilization management might take different approaches depending on the age, eligibility status, diagnosis, and co-occurring conditions of patients. Understanding these risk factors can better inform actions taken to help transition to the community and avoid multiple hospitalizations.

1 Introduction

Despite the increasing emphasis on outpatient treatment and the advance in pharmacotherapy for behavioral health disorders (BHDs, including mental illness, substance use disorders and dementia), inpatient treatment remains a major component of behavioral health care. Across the country, approximately a quarter of mental health and substance abuse spending is attributable to inpatient hospital care.(Mark, Coffey, Vandivort-Warren, Harwood, King, et al., 2005; Mark, Levit, Buck, Coffey, & Vandivort-Warren, 2007; Mark, Levit, Vandivort-Warren, Coffey, Buck, et al., 2007)

Many health plans establish utilization management programs to manage costs associated with behavioral health services. These programs typically require providers of inpatient behavioral health services to obtain authorization before admitting a patient and to work with the health plan to manage the length of stay and coordinate care after discharge. A health plan can manage its behavioral health services internally, or it can “carve out” these services to a specialty managed behavioral health organization.

MassHealth, the Massachusetts Medicaid agency, currently requires that its managed care plans provide utilization management programs for behavioral health services. The Primary Care Clinician Plan (PCCP) “carves out” the provision and management of behavioral health services to the Massachusetts Behavioral Health Partnership (MBHP), while three of managed care organizations (MCOs) “carve out” these services to Beacon Health Strategies. The fourth plan (Network Health) manages behavioral health services internally.

MassHealth is interested in developing a program to manage behavioral health hospitalizations for its Fee-for-Service (FFS) members. The Center for Health Policy and Research (CHPR) at the University of Massachusetts Medical School, in collaboration with the MassHealth Quality Office and the MassHealth Office of Behavioral Health, analyzed MassHealth eligibility and claims data to assist in the development of such a program.

MassHealth is one of three possible payers for FFS behavioral health hospitalizations, with Medicare and other state agencies being the others. As such, a hospitalization can be paid entirely by Medicare or other state agencies, by MassHealth alone, or by MassHealth as a secondary payer in conjunction with Medicare or other state agencies. A utilization management program would apply only to the subset of FFS behavioral health hospitalizations for which MassHealth is the only payer. Taking FY 2010 as an example, of nearly 23,000 hospitalizations for mental illness, substance use disorders, or dementia incurred by FFS members, MassHealth was the sole payer for 3,647 (15.9%) of these hospitalizations.

For the FY 2010 analysis in this study, the FFS population was further limited to 1,988 members with 3,032 behavioral health hospitalizations (13.2%) that were paid only by MassHealth, had discharge dates in FY 2010, and had admission dates in FY 2009 or FY 2010. The study excluded hospitalizations not yet discharged as of June 30, 2010 (because data were incomplete) and hospitalizations with significantly long stays (because inclusion would have skewed results). By applying these inclusion and exclusion criteria, the study population included only behavioral health hospitalizations that were less than two years long and had complete data available for analysis. This group was selected because it provides an accurate

representation of FFS member hospitalizations that, in the future, might be managed through a utilization management program.

In addition to analyzing behavioral health hospitalizations for FFS members, this report examines factors associated with length of stay (LOS) and hospital readmission, which have been identified in the literature as significant contributors to the cost of inpatient behavioral health care (Hendryx, Russo, Stegner, Dyck, Ries, et al., 2003; Prince, Akincigil, Kalay, Walkup, Hoover, et al., 2008; Schmutte, Dunn, & Sledge, 2010; Silva, Bassani, & Palazzo, 2009). Longer stays and high readmission rates can also be indicators of ineffective treatment or inadequacy of community-based aftercare services for patients with complex behavioral health needs (Lin, Chen, Lin, Lee, Ko, et al., 2010). Better understanding of factors associated with increased length of stay and risk of readmission can assist in development of care management policies that support transition to the community and help reduce readmissions.

This report also compares behavioral health hospitalizations of MassHealth members enrolled in the FFS plan, the MCOs (Boston Medical Center, Fallon Community Health Plan, Network Health, and Neighborhood Health Plan)¹, and the PCCP. In this comparative analysis of MassHealth plans, behavioral health hospitalizations were limited to those paid only by MassHealth for FFS members and those reported in MCO and MBHP encounter data for MCO and PCCP members. Analyses of hospital LOS and the probability of hospital readmission for MCO and PCCP members relative to FFS members were also performed.

This report is the second in a series of analyses of behavioral health inpatient utilization data for MassHealth FFS members. The first report, *Hospitalizations for Behavioral Health Disorders in Adult MassHealth Fee-for-Service Members, 2010*, examined hospitalizations for which MassHealth was a secondary payer (for hospitalizations also covered by Medicare or other state agencies) or the only payer.

2 Methods

2.1 Data Sources

The results presented in this report were based on MassHealth eligibility data, FFS claims data, and MCO and MBHP encounter data for FY 2009 (July 1, 2008 to June 30, 2009) and FY 2010 (July 1, 2009 to June 30, 2010). For hospitalization claims incurred by FFS members, the analysis only included hospitalizations paid only by MassHealth. Crossover inpatient claims for Medicare deductibles and/or copayments and pass-through claims for inpatient services paid by other state agencies were excluded.

2.2 Study Population

The analysis of FFS behavioral health hospitalizations focused on adult MassHealth FFS members (aged 19 and older). MassHealth FFS members are MassHealth members excluded from participating in the MassHealth managed care plans, which include the PCCP and MassHealth-contracted MCOs. The adult MassHealth FFS population mainly consists of members who have Medicare or other insurance coverage, are enrolled in home and community-based waivers, receive hospice, or reside in long-term care facilities (e.g., nursing

¹ Health New England, added in 2010, is not included in the analysis.

facilities, chronic or rehabilitation hospitals, and state psychiatric hospitals). The population included adult MassHealth FFS members who had one or more behavioral health hospitalizations paid only by MassHealth with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. These criteria were used in order to identify all behavioral health hospitalizations in FY 2010 that were less than two years long and that had complete data available for analysis. According to the inclusion/exclusion criteria, 615 hospitalizations were excluded from the study population. Therefore, 1,988 members and 3,032 hospitalizations were retained for the current analysis. See Appendix B for information on these 615 excluded hospitalizations.

The comparative analysis examined differences in hospitalizations incurred by adult FFS, MCO, and PCCP members and analyzed hospital LOS and readmission for MCO and PCCP members in relation to FFS members. This analysis was limited to adults aged 19 through 64 because the majority of MCO and PCCP members are younger than 65 years old. In addition, FFS hospitalizations were limited to those paid only by MassHealth. The identification and the inclusion of behavioral health hospitalizations followed the same approach used for adult FFS members. For the comparative analysis, the study population included 3,115 MCO members with 4,675 behavioral health hospitalizations; 7,035 PCCP members with 12,640 behavioral health hospitalizations; and 1,831 FFS members with 2,836 hospitalizations included in the study population.

2.3 Behavioral Health Disorders

The identification of mental illness, substance use disorders, and dementia was based on the International Classification of Disease, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes. For the purpose of this analysis, the principal diagnosis was used to classify hospitalizations into various BHD categories based on the Clinical Classification Software developed by the Agency for Healthcare Research and Quality. Diagnosis codes were classified into several clinically meaningful categories of mental illness, substance use disorders, and dementia. Several disease categories were combined because of their low occurrence in the study population. The seven major BHD categories used in the analysis were:

- Anxiety disorders,
- Delirium, dementia, and amnesic and cognitive disorders (delirium/dementia),
- Bipolar disorders,
- Depressive disorders,
- Schizophrenia/other psychotic disorders,
- Substance use disorders, and
- Other disorders

Details of these BHDs and corresponding ICD-9-CM diagnosis codes are shown in Appendix A.

2.4 Unit of Analysis

For this report, the unit of analysis depended on the type of information provided. In summarizing patient characteristics and identifying hospital readmission, the unit of analysis was the patient. For the remainder of the analysis (e.g., the frequency of principal diagnosis, hospital length of stay, and payments), the unit of analysis was the hospitalization because individuals may have had multiple hospitalizations.

Behavioral health hospitalizations with discharge dates that occurred in FY 2010 (July 1, 2009 to June 30, 2010) and admission dates that occurred in FY 2009 or FY 2010 were included in the analysis. When examining hospital readmissions for BHDs, the identification of the index hospitalization followed the approach described. However, all readmissions with admission dates that occurred in FY 2010 were also included, regardless of when the discharge occurred.

2.5 Regression Analysis

In addition to statistics describing patient and hospitalization characteristics for behavioral health hospitalizations paid only by MassHealth for FFS members, the study used multiple logistic regression models to examine variables associated with long LOS and hospital readmissions for these members. Two sets of analyses were conducted; one set included all behavioral health hospitalizations and controlled for principal diagnoses of hospitalizations; the other set included diagnosis-specific analyses in which selected principal diagnoses were examined separately.

For the comparative analysis of MassHealth plans (FFS, MCOs, and PCCP), hospital LOS was estimated using ordinary least squares linear regression in which LOS was modeled as a continuous variable. The multiple logistic regression model was used to examine the probability of being readmitted within 30 days for MCO and PCCP members relative to FFS members. Analyses including all BHDs and for each specific BHD were separately conducted.

2.5.1 Outcomes

To analyze LOS for FFS behavioral health hospitalizations paid only by MassHealth, the study examined variables associated with hospital LOS longer than 30 days and longer than the 75th percentile, respectively. According to MassHealth regulations, behavioral health hospitalizations are covered by MassHealth up to 30 days for FFS members. However, the analysis showed that the average and median hospital LOS for BHDs were much shorter than 30 days. Therefore, variables associated with LOS being at the top 25% of the observations, i.e., LOS longer than the 75th percentile, were also examined. Another reason for examining variables associated with hospitalizations in this range was that the distribution of LOS varied substantially across BHDs. While the 75th percentile of LOS for all behavioral health hospitalizations was 12 days, it was 12 days for bipolar disorders, 11 days for depression, 20 days for schizophrenia, 9 days for substance use disorders, and 115 days for dementia.

For the readmission analysis for FFS members, the outcome was a dichotomous variable indicating whether a member had a readmission for any BHD within 30 days after being discharged from the index hospitalization. The first hospitalization for mental illness, substance use disorders, or dementia in FY 2009 or 2010 for each individual patient was identified as the index hospitalization. The principal diagnosis of the index hospitalization and of the readmission did not have to be the same.

For the analysis comparing hospital LOS in MCO and PCCP members to that in FFS members, the outcome (LOS) was a continuous variable. In contrast to the FFS member-only analysis described above, the primary purpose of this comparative analysis was to examine differences in LOS between MassHealth plans (FFS, MCOs, and PCCP) rather than to identify factors associated with long LOS. The outcome in the 30-day hospital readmission analysis was a dichotomous variable and the definition and the derivation of this variable followed the approach described above.

2.5.2 Variables Associated with LOS and Readmission

The regression analysis adjusted for the following factors: demographics, health insurance coverage and agency affiliation, comorbidity, the overall disease burden, prior behavioral health hospitalization, the source of admission, and type of hospital. Literature has shown that these variables are potentially associated with long LOS and readmission. Demographic variables included age, gender, race, and disability status. Members who were dually eligible for Medicare and Medicaid, affiliated with the Department of Mental Health (DMH), and residing in long-term care facilities were separately identified. Comorbidity included co-occurring mental illness and substance use disorders (SUDs) and selected chronic physical conditions including cancer, HIV, cardiovascular disease, central nervous system disease (CNS), and developmental disorders. Additionally, the overall disease burden was represented by the DxCG score, which was calculated by MassHealth using the Medicaid FFS AgeSex Med+Rx model. Occurrence of any behavioral health hospitalization in the past 12 months, admission from the emergency department, and type of hospital (acute inpatient hospital, chronic inpatient hospital, inpatient psychiatric hospital, and semi-acute hospital) were separately identified from claims data. For the analysis including all BHDs, the study also controlled for principal diagnosis in the model. For the comparison of hospital LOS and hospital readmission between MassHealth plans (FFS, MCOs and PCCP), plan was included as a categorical variable using FFS as the reference group.

2.5.3 Regression Model

Factors associated with LOS and readmission. In the analysis of factors associated with LOS and readmission (for FFS members only), multiple logistic regression was used to model LOS longer than 30 days, LOS longer than the 75th percentile, and hospital readmission within 30 days because these outcomes were coded as dichotomous variables. The estimated odds ratio (OR) and associated 95% confidence intervals (CIs) for each independent variable were reported. An OR larger than one indicates that the presence of the specified variable is associated with a higher likelihood of having longer LOS (i.e., LOS>30 days or LOS>75th percentile) or being readmitted within 30 days relative to the reference group. When the 95% CIs do not include 1.0, the association between the specified variable and the outcome is considered statistically significant at the 0.05 level (i.e., $p < 0.05$).

For the LOS analysis that included all BHDs, variables associated with LOS longer than 30 days were examined, followed by variables associated with LOS that exceeded the 75th percentile (>12 days) for the entire study population. Because some types of hospitals were more inclined to admit individuals with specific principal diagnoses than others, the analysis initially excluded the type of hospital (acute inpatient hospital, chronic inpatient hospital, inpatient psychiatric hospital, and semi-acute hospital) from the model. We then included type of hospital in the model to assess the effect of type of hospital on LOS and whether there was any significant change on estimates of other variables. Results from models excluding and including type of hospital were reported.

For the diagnosis-specific LOS analysis, selected principal diagnoses included bipolar disorders, depression, schizophrenia and other psychotic disorders, substance use disorders, and dementia/delirium. Only variables associated with LOS longer than the 75th percentile for each selected principal diagnosis were examined because only a small proportion of hospitalizations had LOS longer than 30 days. The type of hospital was included in the model.

For modeling readmission within 30 days, the analysis began by including all behavioral health hospitalizations and adjusting for the principal diagnosis of the index hospitalization, followed by the diagnosis-specific analysis for each selected principal diagnosis (bipolar disorders, depression, schizophrenia, and substance use disorders.) The readmission analysis adjusted for variables available upon the index hospital admission. In a separate analysis, LOS of the index hospitalization was included in the model to explore the association between LOS and readmission within 30 days. However, a significant association between LOS and readmission within 30 days was not found, and estimates of other variables did not change significantly. Therefore, only findings from the model including variables upon hospital admission were reported.

Comparative analysis of MassHealth plans with regard to LOS and readmission. Ordinary least squares linear regression was used for comparing hospital LOS between MassHealth plans because the outcome (LOS) used in the model was a continuous variable. The estimates and associated 95% CIs for variables indicating differences between MassHealth plans were reported. The analysis of hospital readmission followed the same approach described above; however, the main focus was on the relationship between MassHealth plans and the likelihood of being readmitted within 30 days. In the LOS and readmission analyses, separate analyses were conducted in which all BHDs were included in the model together as well as separately.

3 Results

The findings are presented in two sections: analysis of FFS behavioral health hospitalizations paid only by MassHealth, and comparative analysis of behavioral health hospitalizations for FFS, MCO, and PCCP members.

3.1 FFS Behavioral Health Hospitalizations Paid Only by MassHealth

The findings on FFS behavioral health hospitalizations paid only by MassHealth are presented in the following order:

- 1) Trends of behavioral health hospitalizations, FY 2007 to FY 2010,
- 2) Overview of behavioral health hospitalizations in FY 2010,
- 3) Hospitalizations, readmission, and payments,
- 4) Patient characteristics,
- 5) Characteristics of hospitalizations for BHDs,
- 6) Factors associated with length of stay, and
- 7) Factors associated with readmission.

3.1.1 Trends for Behavioral Health Hospitalizations, FY 2007 to FY 2010

Table 1 shows the yearly number of members with behavioral health hospitalizations, number of behavioral health hospitalizations, discharges per 1,000 FFS members, and MassHealth payments for these hospitalizations. The number of FFS members with behavioral health hospitalizations ranged from 1,798 (FY 2008) to 2,036 (FY 2007) and the number of behavioral hospitalizations ranged from 2,673 (FY 2008) to 3,128 (FY 2007). After adjusting for the number of FFS members in each year, there were 10.4 behavioral health hospitalizations per 1,000 FFS members in FY 2007, approximately two hospitalizations greater than that in subsequent years (FY 2008 to FY 2010). In FY 2008-2010, the discharge rate per 1,000 members was 15.4% to

23.0% less than in FY 2007. MassHealth payments for behavioral health hospitalizations decreased from \$27 million in FY 2007 to \$24 million in FY 2010. These payments were adjusted for inflation using the Medical Care Component of the Northeast Region Consumer Price Index and are expressed in 2010 dollars.

Table 1. Overview of Behavioral Health Hospitalizations and Payments for Adult FFS Members, FY 2007 - FY 2010

Item	FY2007	FY2008	FY2009	FY2010
Number of FFS members ¹	299,623	302,984	335,172	381,142
Members with BHD hospitalizations	2,036	1,798	1,856	1,988
Number of BHD hospitalizations	3,128	2,673	2,706	3,032
Number of inpatient days	53,226	48,415	41,955	43,837
BHD hospitalizations per 1,000 FFS members ¹	10.4	8.8	8.1	8.0
% change compared to FY2007	ref	-15.4%	-22.1%	-23.0%
MassHealth BHD hospital payments ²	\$27,242,434	\$25,580,037	\$21,564,890	\$24,074,397

¹ Estimated number of FFS members with MassHealth only coverage and FFS dual eligibles with behavioral health hospitalizations paid only by MassHealth

² Inflation adjusted and expressed in 2010 dollars

Table 2 provides summary statistics of behavioral health hospitalizations over time (FY 2007 to FY 2010). On average, FFS members had 1.5 behavioral health hospitalizations per year, which remained consistent over the time period. The average hospital length of stay decreased from 17.0 days in FY 2007 to 14.5 days in FY 2010, which reflects a 14.7% decrease ($p < 0.01$ for trend test). Similarly, the number of inpatient days per patient in FY 2010 (22.1 days) showed a 15.3% decrease ($p < 0.01$ for trend test) relative to FY 2007 (26.1 days). Hospital readmission rates decreased slightly over years and the number of days between discharge and readmission only reflects a 4% increase from FY 2007 (44.6 days) to FY 2010 (46.3 days) ($p = 0.17$ for trend test). While MassHealth payments for behavioral health hospitalizations per patient and per hospitalization showed a nearly 10% decrease ($p < 0.01$ for trend test), payments per day increased 7% from \$512 in FY 2007 to \$549 in FY 2010 ($p = 0.09$ for trend test).

Table 2. Behavioral Health Hospitalizations Paid Only by MassHealth, Readmissions, and Payments for Adult FFS Members, FY 2007 – 2010

Item	FY2007 (N=3,128)		FY2008 (N=2,673)		FY2009 (N=2,706)		FY2010 (N=3,032)		% change (2010 vs. 2007)
	N	%	N	%	N	%	N	%	
Hospitalizations for behavioral health disorders									
Hospitalizations per patient									
Mean (SD)	1.54 (1.40)		1.49 (1.43)		1.46 (1.35)		1.53 (1.31)		-0.7%
One	1,495	73.4	1,359	75.6	1,450	78.1	1,488	74.9	
Two	319	15.7	267	14.9	233	12.6	275	13.8	
Three or more	222	10.9	172	9.6	173	9.3	225	11.3	
Length of stay per hospitalization									
Mean (SD)	17.0 (44.1)		18.1 (44.2)		15.5 (39.8)		14.5 (32.2)		-14.7% ¹
Median	8		8		8		8		
1-7 days	1,392	44.5	1,181	44.2	1,217	45.0	1,419	46.8	
8-14 days	971	31.0	819	30.6	899	33.2	965	31.8	
15-21 days	346	11.1	267	10.0	255	9.4	287	9.5	
22-30 days,	180	5.8	178	6.7	160	5.9	183	6.0	
More than 30 days	239	7.6	228	8.5	175	6.5	178	5.9	
Inpatient days per patient									
Mean (SD)	26.1 (55.7)		26.9 (55.1)		22.6 (49.4)		22.1 (43.7)		-15.3% ¹
Median	11		11		10		10		
1-7 days	693	34.0	621	34.5	712	38.4	736	37.0	
8-14 days	530	26.0	455	25.3	486	26.2	553	27.8	
15-30 days	422	20.7	375	20.9	369	19.9	378	19.0	
31-60 days	224	11.0	200	11.1	163	8.8	191	9.6	
More than 60 days	167	8.2	147	8.2	126	6.8	130	6.5	
Hospital readmissions for behavioral health disorders									
Percentage of patients readmitted									
Within 30 days	359	17.6	287	16.0	275	14.8	318	16.0	
Within 60 days	438	21.5	368	20.5	336	18.1	377	19.0	
Within 90 days	489	24.0	395	22.0	379	20.4	417	21.0	
Days bet. discharge and readmission									
Mean (SD)	44.5 (56.9)		45.1 (59.8)		45.0 (56.7)		46.3 (58.7)		+4.0%
Median	21		19		21.5		23		
Payments for hospitalizations for behavioral health disorders ²									
Total payment	\$27,242,434		\$25,580,037		\$21,564,890		\$24,074,397		
Total payments per patient									
Mean (SD)	13,380 (18,360)		14,227 (21,611)		11,619 (17,629)		12,110 (20,058)		-9.5% ¹
Median	7,675		7,708		6,400		6,548		
Total payments per hospitalization									
Mean (SD)	8,709 (12,061)		9,570 (15,276)		7,969 (12,667)		7,940 (13,819)		-8.8% ¹
Median	5,761		5,852		5,368		5,401		
Total payments per day									
Mean (SD)	512 (1,613)		528 (1,627)		514 (1,485)		549 (1,462)		+7.2%
Median	569		551		540		538		

¹ Trend test was statistically significant (p<0.05). ² Inflation adjusted and expressed in 2010 dollars.

Table 3 presents the principal diagnosis of behavioral health hospitalizations over time (FY 2007 to FY 2010). The distribution of principal diagnoses was similar across years. Hospitalizations for bipolar disorders increased slightly (from 642 discharges in FY 2007 to 709 in FY 2010), while hospitalizations for schizophrenia and other psychotic disorders showed a slight decrease.

Table 3. Principal Diagnosis of Behavioral Health Hospitalizations Paid Only by MassHealth for Adult FFS Members, FY 2007 – 2010

Principal diagnosis	FY2007 (N=3,128)		FY2008 (N=2,673)		FY2009 (N=2,706)		FY2010 (N=3,032)	
	N	%	N	%	N	%	N	%
Anxiety disorders	70	2.2	81	3.0	85	3.1	102	3.4
Delirium/dementia	137	4.4	126	4.7	123	4.6	144	4.8
Bipolar disorders	642	20.5	537	20.1	630	23.3	709	23.4
Depressive disorders	564	18.0	422	15.8	501	18.5	570	18.8
Schizophrenia and other psychotic disorders	923	29.5	818	30.6	762	28.2	780	25.7
Substance use disorders	716	22.9	631	23.6	556	20.6	672	22.2
Others	76	2.4	58	2.2	49	1.8	55	1.8

The following sections provide more detail on behavioral health hospitalizations in FY 2010.

3.1.2 Overview of Behavioral Health Hospitalizations in FY 2010

Table 4 provides an overview of FFS members with behavioral health hospitalizations based on discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. The first column shows behavioral health hospitalizations paid by all payers, including MassHealth, Medicare, and other state agencies. The second column provides results on behavioral health hospitalizations paid only by MassHealth. Of the 11,583 members and 21,344 behavioral health hospitalizations in FY 2010, 1,988 members (17.2%) had 3,032 (14.2%) hospitalizations that were paid only by MassHealth. All subsequent tables in this report are based on these hospitalizations paid only by MassHealth.

Table 4. Overview of Behavioral Health Hospitalizations and Payments for Adult FFS Members, FY 2010

Item	Paid by MassHealth and Others ¹	Paid Only by MassHealth ¹
FFS members with BHD hospitalizations	11,583	1,988
Number of BHD hospitalizations	21,344	3,032
Number of inpatient days	285,910	43,837
BHD hospitalizations per 1,000 FFS members	33.5 ²	8.0 ³
MassHealth BHD hospital payments	\$198,122,784	\$24,074,397

¹ Based on hospitalizations with discharge dates in FY2010 and admission dates in FY 2009 or FY 2010.

² Based on estimated all FFS members (N=636,710).

³ Based on estimated number of FFS members with MassHealth only coverage and FFS dual eligibles with behavioral health hospitalizations paid only by MassHealth (N=381,142)

3.1.3 Hospitalizations, Readmissions, and Payments

Table 5 provides summary statistics for hospitalizations incurred by the study population. On average, these members had 1.5 hospitalizations, a length of stay of 14.5 days, and 22 inpatient days in FY 2010. While 652 patients (33%) had multiple hospitalizations for BHDs in FY 2010, 318 (16%) were readmitted within 30 days after the initial hospital discharge.

MassHealth paid \$24 million for behavioral health hospitalizations for the study population, which includes payments made in FY 2009 and FY 2010. On average, the total payments for behavioral health hospitalizations were \$12,110 per patient, \$7,940 per hospitalization, and \$549 per inpatient day.

3.1.4 Patient Characteristics

Table 6 presents patient characteristics of adult MassHealth FFS members in the study population (N=1,988). The average age was 44.5 years old, with 90% of the members younger than 65 years old. Men and women made up an equal proportion of patients hospitalized for BHDs.

Of the 1,988 patients, 741 (25.2%) had disabilities determined by the Social Security Administration or the Massachusetts Disability Evaluation Services. Almost a quarter of patients (23.9%) received services from the Department of Mental Health. Additionally, a third of patients (33%) hospitalized for BHDs were dually eligible for Medicare and Medicaid. Over one third of patients (36.5%) had dual diagnoses of mental illness and substance use disorder.

Table 5. Behavioral Health Hospitalizations Paid Only by MassHealth, Readmissions, and Payments, FY 2010

Item	N or Mean (SD) ¹	%
Behavioral health hospitalizations		
Hospitalizations per patient		
Mean (SD)	1.53 (1.31)	
One	1,336	67.2
Two	273	13.7
Three or more	379	19.1
Length of stay per hospitalization		
Mean (SD)	14.5 (32.2)	
Median	8	
1-7 days	1,419	46.8
8-14 days	965	31.8
15-21 days	287	9.5
22-30 days	183	6.0
More than 30 days	178	5.9
Inpatient days per hospitalization		
Mean (SD)	22 (43.7)	
Median	10	
1-7 days	736	37.0
8-14 days	553	27.8
15-30 days	207	10.4
31-60 days	171	8.6
More than 60 days	321	16.2
Hospital readmissions for behavioral health disorders		
Percentage of patients readmitted		
Within 30 days	318	16.0
Within 60 days	377	19.0
Within 90 days	417	21.0
Days between discharge and readmission		
Mean (SD)	46.3 (58.7)	
Median	23	
Payments for behavioral health hospitalizations		
Total payment	24,074,397	
Total payments per patient		
Mean (SD)	12,110 (20,058)	
Median	6,548	
Total payments per hospitalization		
Mean (SD)	7,940 (13,819)	
Median	5,401	
Total payments per day		
Mean (SD)	549 (1,462)	
Median	538	

¹ Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. Length of stay, inpatient days, and payments were based on MassHealth claims from 7/1/2008 through 6/30/2010 (FY 2009 and FY 2010)

Table 6. Characteristics of Adult FFS Members with Behavioral Health Hospitalizations Paid Only by MassHealth, FY 2010

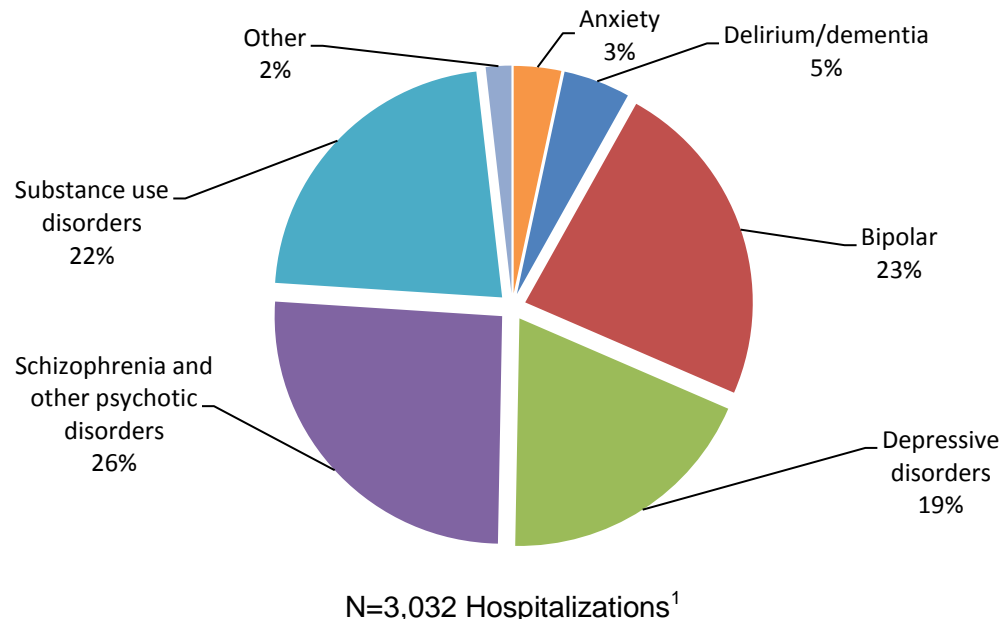
Characteristic	Members¹ (N = 1,988)	
	N or Mean (SD)	%
Demographics		
Age, mean (SD)	44.5	16.1
Age group		
19-34	633	31.8
35-44	408	20.5
45-54	499	25.1
55-64	291	14.6
65-74	56	2.8
75 and older	101	5.1
Gender		
Female	975	49.0
Race/ethnicity		
White	1067	53.7
Black	163	8.2
Hispanic	145	7.3
Other	36	1.8
Unknown	577	29.0
Disability ²		
Yes	741	25.2
≥ 90 days in long-term care facility in the past 12 months	183	9.2
DMH Affiliation and Insurance Coverage		
DMH affiliation	476	23.9
Health Insurance coverage ³		
MassHealth only	1,381	69.5
Dual eligible (MassHealth and Medicare)	664	33.4
MassHealth coverage type		
Standard	1,709	86.0
CommonHealth Benefit Plan	82	4.1
Other	197	9.9
FFS enrollment days		
Mean (SD)	264 (122)	
Illness Burden		
DxCG score (FY 2009), mean (SD)	1.06 (0.4)	
Dual diagnosis of mental illness and substance use disorder	725	36.5

¹ Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010.² Disability determined by the Social Security Administration or Massachusetts Disability Evaluation Services.³ 57 members were counted in both groups due to changes in coverage during the year.

3.1.5 Hospitalization Characteristics

Figure 1 and Table 7 present the principal diagnosis of FFS behavioral health hospitalizations paid only by MassHealth. Of the 3,032 behavioral health hospitalizations, four major BHD categories (schizophrenia/other psychotic disorders (25.7%), substance use disorders (22.2%), bipolar disorders (23.4%), and depressive disorders (18.8%)) comprised most (90.1%) of the hospitalizations for BHDs paid only by MassHealth in FY 2010.

Figure 1. Principal Diagnosis of Behavioral Health Hospitalizations Paid Only by MassHealth



¹ Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010.

In addition to principal diagnosis, Table 7 shows the types of hospital where care was received, the source of admission, and the discharge location. The most common type of hospital providing behavioral health inpatient care to adult MassHealth FFS members was acute inpatient hospitals (59.5%), followed by psychiatric inpatient hospitals (34.7%). However, with limited provider information, the data did not allow us to distinguish distinct psychiatric units from medical/surgical units in acute inpatient hospitals.

The source of admission and the discharge location were based on hospital claims data and were not verified with additional data sources. Most hospitalizations for BHDs were admitted through medical referrals (50.9%), followed by the emergency room (31.7%). Home was the most common discharge location for hospitalizations for BHDs. Death during hospitalizations for BHDs was rare (1.3%).

For additional information on behavioral health hospitalizations for FFS members, see Appendix C, which includes a bivariate analysis of relationships between diagnosis, age, gender, type of hospital, admission source, length of stay, and readmission.

Table 7. Characteristics of Behavioral Health Hospitalizations Paid Only by MassHealth for Adult FFS Members, FY 2010

Characteristic	Hospitalizations (N = 3,032)¹	
	N	%
Principal diagnosis		
Anxiety disorders	102	3.4
Delirium/dementia	144	4.8
Bipolar disorders	709	23.4
Depressive disorders	570	18.8
Schizophrenia and other psychotic disorders	780	25.7
Substance use disorders	672	22.2
Others	55	1.8
Type of hospital		
State agency services		
Acute inpatient hospital	1,805	59.5
Chronic inpatient hospital	66	2.2
Psychiatric inpatient hospital	1053	34.7
Semi-acute inpatient hospital	108	3.6
Source of admission		
Medical referral ²	1,542	50.9
Emergency room	960	31.7
Transfer from one unit to another - same hospital	21	0.7
Transfer from other facility ³	431	14.2
Court/law enforcement	1	0.0
Information not available	77	2.5
Discharge location		
Home	2,501	82.5
Acute care hospital	99	3.3
Post-acute care facility	243	8.0
Psychiatric hospital	49	1.6
Left against medical advice	102	3.4
Patient died	38	1.3

¹ Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010.

² Including physicians, clinics, and HMOs.

³ Including hospitals, skilled nursing facilities, and other health care facilities.

3.1.6 Factors Associated with Length of Stay

Table 8 shows results of modeling LOS longer than 30 days and LOS longer than the 75th percentile (12 days) when all BHDs were included in the analysis. Findings from models with and without the type of hospital variable were reported separately.

For the analysis in which type of hospital was excluded, the following variables were associated with a statistically significant increase in the odds of having LOS longer than 30 days and longer than the 75th percentile (12 days) unless otherwise specified:

- Aged 65 to 74 and aged 75 and older
- Dually eligible for Medicare and Medicaid
- DMH affiliation
- Hospitalized for dementia or schizophrenia
- Comorbid cancer (LOS longer than 30 days)
- Comorbid cardiovascular diseases (LOS longer than 12 days)
- Having any behavioral health hospitalization within a year prior to the index hospitalization (LOS longer than 30 days)

For the analysis in which type of hospital was excluded, the following variables were associated with a statistically significant decrease in the odds of having LOS longer than 30 days and longer than the 75th percentile (12 days) unless otherwise specified:

- Co-occurring mental illness and SUD
- Hospitalized for SUD (LOS longer than 12 days)

After including type of hospital in the model, the effects of being aged 75 and older, having dual eligibility, and having dementia were no longer statistically significant. Instead, members admitted to chronic hospitals were associated with highly significantly increased odds of longer LOS (ORs=69.6 for predicting LOS>30 days and 118.4 for predicting LOS>the 75th percentile (12 days)) than those admitted to acute hospitals. As shown in Appendix C, members with dementia were more likely to be admitted to chronic inpatient hospitals and those with dementia were older. This relationship may explain the effects of these variables on LOS being mitigated after including type of hospital in the model. Notably, members who were admitted to a psychiatric hospital also had higher odds of staying longer than the 75th percentile (12 days) (OR=1.9) compared to those admitted to acute hospitals.

Table 8. Regression Models for Length of Stay of Behavioral Health Hospitalizations Paid Only by MassHealth for Adult FFS Members, FY 2010

N=3,032 ¹	LOS > 30 days, without type of hospital		LOS > 75 th percentile (12 days), without type of hospital		LOS > 30 days, with type of hospital		LOS > 75 th percentile (12 days), with type of hospital	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age								
19-34	Ref.		Ref.		Ref.		Ref.	
35-44	0.61	(0.33, 1.15)	1.21	(0.92, 1.59)	0.75	(0.39, 1.41)	1.23	(0.93, 1.63)
45-54	0.81	(0.46, 1.44)	1.35*	(1.01, 1.80)	0.94	(0.52, 1.71)	1.38*	(1.02, 1.87)
55-64	0.78	(0.40, 1.53)	1.36	(0.98, 1.88)	0.87	(0.43, 1.76)	1.43*	(1.02, 2.01)
65-74	2.58*	(1.10, 6.06)	1.94*	(1.11, 3.38)	2.73*	(1.11, 6.72)	2.25**	(1.28, 3.96)
75 and older	5.45***	(2.14, 13.87)	2.24*	(1.18, 4.25)	1.32	(0.39, 4.48)	0.83	(0.37, 1.85)
Male	0.89	(0.62, 1.27)	1.12	(0.93, 1.36)	0.96	(0.65, 1.43)	1.15	(0.94, 1.41)
Race								
White	Ref.		Ref.		Ref.		Ref.	
Black	1.34	(0.72, 2.48)	1.26	(0.92, 1.72)	1.59	(0.85, 2.99)	1.24	(0.90, 1.72)
Other	1.29	(0.64, 2.60)	0.89	(0.62, 1.28)	1.38	(0.68, 2.81)	0.91	(0.63, 1.31)
Unknown	0.97	(0.64, 1.47)	1.06	(0.86, 1.31)	1.23	(0.78, 1.94)	1.1	(0.88, 1.37)
Disability	1.14	(0.75, 1.73)	1.03	(0.84, 1.25)	1.15	(0.75, 1.76)	1.05	(0.86, 1.29)
Dual eligibility	1.55*	(1.09, 2.20)	1.63***	(1.35, 1.96)	1.17	(0.78, 1.76)	1.17	(0.95, 1.44)
DMH affiliation	1.89**	(1.20, 2.97)	1.61***	(1.29, 2.00)	2.35***	(1.49, 3.71)	1.67***	(1.33, 2.08)
Principal diagnosis								
Anxiety	Ref.		Ref.		Ref.		Ref.	
Dementia	10.91**	(2.22, 53.64)	2.13*	(1.06, 4.29)	4.11	(0.75, 22.46)	1.53	(0.72, 3.26)
Bipolar	2.26	(0.51, 10.08)	1.04	(0.62, 1.73)	2.29	(0.51, 10.27)	1.05	(0.63, 1.75)
Depressive	1.28	(0.27, 6.15)	0.84	(0.50, 1.42)	0.97	(0.20, 4.80)	0.88	(0.52, 1.49)
Schizophrenia	5.39*	(1.25, 23.30)	1.92*	(1.16, 3.18)	5.05*	(1.16, 22.00)	1.94*	(1.17, 3.21)
Substance use	0.81	(0.14, 4.52)	0.50*	(0.29, 0.87)	0.65	(0.11, 3.79)	0.56*	(0.32, 0.99)
Others	4.9	(0.76, 31.58)	0.74	(0.30, 1.78)	4.54	(0.70, 29.36)	0.8	(0.33, 1.95)
Co-occurring mental illness and substance use disorders	0.56*	(0.35, 0.89)	0.60***	(0.49, 0.74)	0.58*	(0.36, 0.94)	0.57***	(0.46, 0.70)
Physical comorbidity								
Cancer	2.55**	(1.34, 4.85)	1.28	(0.87, 1.89)	1.75	(0.83, 3.69)	1.14	(0.75, 1.73)
HIV	1.26	(0.52, 3.08)	1.33	(0.88, 2.00)	1.06	(0.40, 2.84)	1.27	(0.83, 1.92)
Cardiovascular	1.43	(0.91, 2.24)	1.33**	(1.07, 1.64)	1.57	(0.98, 2.54)	1.40**	(1.13, 1.74)
CNS	1.16	(0.80, 1.70)	1.16	(0.95, 1.41)	1.39	(0.93, 2.08)	1.25*	(1.03, 1.53)
Developmental disorder	0.72	(0.33, 1.58)	1.18	(0.82, 1.70)	0.71	(0.32, 1.59)	1.22	(0.85, 1.76)
Hospitalization within 12month	1.49*	(1.02, 2.18)	1.17	(0.95, 1.45)	1.33	(0.88, 2.03)	1.1	(0.88, 1.36)
Admitted from ED	0.99	(0.67, 1.48)	0.93	(0.77, 1.14)	1.22	(0.80, 1.86)	1.17	(0.95, 1.44)

N=3,032 ¹	LOS > 30 days, without type of hospital		LOS > 75 th percentile (12 days), without type of hospital		LOS > 30 days, with type of hospital		LOS > 75 th percentile (12 days), with type of hospital	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
DXCG score	0.87	(0.61, 1.22)	0.94	(0.73, 1.19)	0.87	(0.56, 1.37)	0.91	(0.68, 1.21)
Type of hospital								
Acute hospital	NA		NA		Ref.		Ref.	
Chronic hospital	NA		NA		69.64***	(23.60, 205.51)	118.36***	(25.74, 544.30)
Psychiatric hospital	NA		NA		0.72	(0.45, 1.16)	1.90***	(1.52, 2.37)
Semi-Acute hospital	NA		NA		N/A		0.9	(0.42, 1.91)

* p<0.05 ** p<0.01 *** p<0.001

¹ Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010.

Table 9 shows results for the diagnosis-specific analysis. The outcome, LOS, was converted into a dichotomous variable indicating whether the LOS was longer than the 75th percentile for each selected principal diagnosis. For members hospitalized for mental illness, co-occurring SUD was associated with shorter LOS. In contrast, for people hospitalized with SUD, co-occurring mental illness was associated with an increased likelihood of long LOS (OR=1.6) although it was not statistically significant ($p>0.05$). Additionally, compared to people aged 19 to 34, older age was generally associated with LOS longer than the 75th percentile although the effects did not all reach the $p<0.05$ significance level. Other diagnosis-specific findings are summarized below.

Hospitalizations for bipolar disorders

- The following variables were associated with a statistically significant increase in the odds of LOS longer than the 75th percentile (12 days):
 - Age 55 to 64
 - Developmental disorder
 - Admitted to a psychiatric hospital

Hospitalizations for depression

- The following variables were associated with a statistically significant increase in the odds of LOS longer than the 75th percentile (11 days):
 - Dually eligible for Medicare and Medicaid
 - Comorbid cancer or HIV
 - Admitted to a psychiatric hospital
- The following variables were associated with a statistically significant decrease in the odds of LOS longer than the 75th percentile (11 days):
 - Co-occurring SUD

Hospitalizations for schizophrenia and other psychotic disorders

- The following variables were associated with a statistically significant increase in the odds of LOS longer than the 75th percentile (20 days):
 - Age 65 to 74
 - DMH affiliation
 - Having any behavioral health hospitalization within a year prior to the index hospitalization
- The following variables were associated with a statistically significant decrease in the odds of LOS longer than the 75th percentile (20 days):
 - Co-occurring SUD

Hospitalizations for substance use disorders

- The following variables were associated with a statistically significant increase in the odds of LOS longer than the 75th percentile (9 days):
 - Age 55 to 64
 - Comorbid cardiovascular diseases
 - Admitted to a psychiatric hospital or a semi-acute hospital
- The following variables were associated with a statistically significant decrease in the odds of LOS longer than the 75th percentile (9 days):
 - higher overall disease burden (DxCG score)

Hospitalizations for dementia/delirium

- The following variables were associated with a statistically significant increase in the odds of LOS longer than the 75th percentile (115 days)
 - Admitted to a chronic hospital

Table 9. Factors Associated with Behavioral Health Hospital Length of Stay for Selected Principal Diagnoses for Adult FFS Members, FY 2010

	Bipolar - LOS ≥ 12 days (N = 709) ¹		Depressive - LOS ≥ 11 days (N = 570) ¹		Schizoph./Other Psychot. - LOS ≥ 20 days (N = 780) ¹		Substance Use - LOS ≥ 9 days (N = 672) ¹		Dementia - LOS ≥ 115 days (N = 144) ¹	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age										
19-34	Ref.		Ref.		Ref.		Ref.		Ref.	
35-44	0.96	(0.57, 1.62)	0.96	(0.50, 1.83)	1.13	(0.62, 2.05)	1.34	(0.74, 2.42)	N/A	
45-54	1.16	(0.64, 2.10)	1.08	(0.53, 2.23)	1.16	(0.59, 2.28)	1.74	(0.92, 3.30)	N/A	
55-64	2.32*	(1.12, 4.78)	1.22	(0.58, 2.56)	1.21	(0.59, 2.50)	2.00*	(1.00, 3.99)	N/A	
65-74	3.21	(0.84, 12.30)	0.33	(0.03, 3.22)	2.79*	(1.04, 7.47)	N/A		N/A	
75 and older	4.33	(0.48, 38.98)	5.86	(0.47, 73.61)	0.43	(0.04, 4.08)	3.51	(0.29, 43.21)	0.29	(0.03, 2.84)
Male	1.14	(0.75, 1.73)	1.1	(0.67, 1.81)	0.71	(0.48, 1.04)	1.24	(0.79, 1.96)	1.56	(0.50, 4.90)
Race										
White	Ref.		Ref.		Ref.		Ref.		Ref.	
Black	0.81	(0.41, 1.62)	0.92	(0.36, 2.38)	1.21	(0.68, 2.13)	1.21	(0.57, 2.56)	2.46	(0.07, 81.00)
Other	0.81	(0.37, 1.80)	0.81	(0.38, 1.76)	1.12	(0.58, 2.15)	0.5	(0.20, 1.28)	8.05	(0.09, 743.42)
Unknown	0.77	(0.51, 1.18)	0.75	(0.45, 1.25)	1.04	(0.65, 1.66)	0.71	(0.46, 1.11)	1.77	(0.48, 6.52)
Disability	0.99	(0.66, 1.48)	0.98	(0.61, 1.58)	1.19	(0.81, 1.73)	1	(0.65, 1.53)	N/A	
Dual eligibility	1.22	(0.84, 1.79)	1.90*	(1.12, 3.23)	1.07	(0.73, 1.57)	0.74	(0.44, 1.22)	3.19	(0.14, 70.63)
DMH affiliation	1.24	(0.83, 1.86)	1.38	(0.75, 2.54)	2.13***	(1.40, 3.26)	1.9	(0.90, 3.99)	N/A	
Co-occurring mental illness and substance use disorders	0.72	(0.49, 1.05)	0.46**	(0.28, 0.76)	0.38***	(0.24, 0.62)	1.62	(0.97, 2.71)	N/A	
Physical comorbidity										
Cancer	0.4	(0.13, 1.23)	2.54*	(1.07, 6.01)	0.76	(0.29, 2.00)	1.74	(0.79, 3.84)	1.41	(0.28, 7.10)
HIV	0.8	(0.33, 1.94)	2.24*	(1.04, 4.81)	1.73	(0.67, 4.46)	1.18	(0.57, 2.42)	0.63	(0.03, 13.85)
Cardiovascular	1.14	(0.77, 1.69)	1.43	(0.82, 2.50)	1.27	(0.84, 1.91)	1.91**	(1.17, 3.10)	0.52	(0.05, 5.66)
CNS	1.25	(0.85, 1.85)	1.41	(0.87, 2.29)	1.01	(0.70, 1.47)	1.22	(0.81, 1.85)	0.98	(0.26, 3.77)
Developmental	2.07*	(1.07, 3.99)	1.21	(0.41, 3.59)	0.51	(0.25, 1.04)	0.5	(0.09, 2.91)	N/A	
Hospitalization within 12 mos	0.94	(0.60, 1.47)	0.71	(0.41, 1.22)	1.52*	(1.02, 2.26)	1.45	(0.93, 2.27)	1.1	(0.29, 4.18)
Admitted from ED	1.1	(0.73, 1.65)	0.84	(0.51, 1.41)	1.07	(0.72, 1.58)	1.09	(0.68, 1.75)	1.13	(0.06, 22.20)
DXCG score	0.64	(0.33, 1.22)	1.18	(0.58, 2.38)	1.37	(0.65, 2.92)	0.46**	(0.26, 0.81)	1.04	(0.57, 1.92)
Type of hospital										
Acute hospital	Ref.		Ref.		Ref.		Ref.		Ref.	
Chronic hospital	N/A		1.1	(0.03, 35.13)	N/A		N/A		38.40**	(2.46 599.54)
Psychiatric hospital	1.85**	(1.23, 2.79)	2.65***	(1.60, 4.37)	0.88	(0.59, 1.34)	4.79***	(2.70, 8.50)	N/A	
Semi-Acute hospital	N/A		N/A		N/A		3.03***	(1.71, 5.38)	N/A	

* p<0.05 ** p<0.01 *** p<0.001

¹ Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010

3.1.7 Factors Associated with Readmission

Table 10 shows results from the analysis of hospital readmission within 30 days. Members with co-occurring mental illness and SUD consistently had significantly higher odds of being readmitted within 30 days compared to those with mental illness or SUD alone. Additionally, compared to the youngest age group (19 to 34), older age was associated with decreased odds of being readmitted within 30 days although not all cases reached the statistical significance level. Findings from the analysis including all BHDs and from diagnosis-specific analyses are summarized below.

All BHDs for the index hospitalization

- The following variables were associated with a statistically significant increase in the odds of being readmitted within 30 days:
 - Disability
 - Comorbid cardiovascular diseases or developmental disorders
 - Co-occurring mental illness and SUD
- The following variables were associated with a statistically significant decrease in the odds of being readmitted within 30 days:
 - Older age (35-44, 44-54, 55-64, and 65-74)

Bipolar disorders for the index hospitalization

- The following variables were associated with a statistically significant increase in the odds of being readmitted within 30 days:
 - Black race
 - Co-occurring SUD
 - Index hospitalization occurred in a psychiatric hospital

Depression for the index hospitalization

- The following variables were associated with a statistically significant increase in the odds of being readmitted within 30 days:
 - Co-occurring SUD
 - Having any behavioral health hospitalization within a year prior to the index hospitalization
- The following variables were associated with a statistically significant decrease in the odds of being readmitted within 30 days:
 - aged 55 to 64
 - male

Schizophrenia or other psychotic disorder for the index hospitalization

- The following variables were associated with a statistically significant increase in the odds of being readmitted within 30 days:
 - Co-occurring SUD

- The following variables were associated with a statistically significant decrease in the odds of being readmitted within 30 days:
 - aged 55 to 64
 - male
 - Index hospitalization occurred in a psychiatric hospital

Substance use disorder for the index hospitalization

- The following variables were associated with a statistically significant increase in the odds of being readmitted within 30 days:
 - Comorbid cardiovascular diseases
 - Co-occurring mental illness
- The following variables were associated with a statistically significant decrease in the odds of being readmitted within 30 days:
 - aged 35 to 44 or aged 55 to 64

Table 10. Factors Associated with Behavioral Health Hospital Readmission within 30 Days, by Selected Principal Diagnoses, for Adult FFS Members, FY 2010

	All BHDs (N = 1,988) ¹		Bipolar (N = 448) ¹		Depressive (N = 395) ¹		Schizoph./Other psych. (N = 480) ¹		Substance Use (N = 441) ¹	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age										
19-34	Ref.		Ref.		Ref.		Ref.		Ref.	
35-44	0.49**	(0.31, 0.75)	0.86	(0.37, 2.00)	0.35	(0.10, 1.25)	0.44	(0.19, 1.00)	0.27*	(0.10, 0.77)
45-54	0.50**	(0.31, 0.80)	0.87	(0.31, 2.45)	0.8	(0.21, 3.04)	0.4	(0.16, 1.02)	0.32	(0.10, 1.01)
55-64	0.32***	(0.18, 0.56)	0.85	(0.21, 3.42)	0.13*	(0.02, 0.87)	0.20**	(0.07, 0.59)	0.19*	(0.05, 0.67)
65-74	0.22*	(0.05, 0.97)	N/A		1.41	(0.12, 16.93)	0.19	(0.02, 1.63)	N/A	
75 and older	0.67	(0.19, 2.30)	N/A		1.18	(0.04, 33.99)	0.78	(0.10, 5.75)	1.67	(0.08, 34.58)
Male	0.78	(0.57, 1.06)	1.36	(0.68, 2.73)	0.36*	(0.14, 0.94)	0.49*	(0.28, 0.88)	1.00	(0.43, 2.31)
Race										
White	Ref.		Ref.		Ref.		Ref.		Ref.	
Black	1.41	(0.84, 2.34)	3.24*	(1.19, 8.83)	1.52	(0.28, 8.32)	1.05	(0.45, 2.44)	1.58	(0.39, 6.30)
Other	0.94	(0.55, 1.62)	0.78	(0.21, 2.94)	2.87	(0.90, 9.11)	0.99	(0.39, 2.47)	0.62	(0.12, 3.06)
Unknown	1.33	(0.95, 1.85)	0.91	(0.44, 1.87)	1.36	(0.53, 3.46)	2.06*	(1.06, 3.99)	1.18	(0.57, 2.42)
Disability	1.39*	(1.01, 1.91)	1.44	(0.75, 2.74)	1.72	(0.72, 4.14)	0.91	(0.52, 1.61)	1.91	(0.94, 3.90)
Dual eligibility	0.83	(0.58, 1.19)	0.81	(0.39, 1.69)	0.83	(0.30, 2.31)	0.87	(0.47, 1.62)	1.81	(0.78, 4.21)
DMH affiliation	1.19	(0.82, 1.72)	1.06	(0.53, 2.12)	0.55	(0.17, 1.78)	1.54	(0.85, 2.77)	0.57	(0.11, 2.97)
Co-occurring mental illness and substance use disorders	2.83***	(2.04, 3.93)	3.26***	(1.64, 6.47)	2.96*	(1.25, 7.03)	3.23***	(1.74, 6.02)	2.81*	(1.18, 6.71)
Principal diagnosis										
Anxiety	Ref.									
Dementia	0.57	(0.13 2.42)	N/A		N/A		N/A		N/A	
Bipolar	1.21	(0.47 3.08)	N/A		N/A		N/A		N/A	
Depressive	0.96	(0.37 2.50)	N/A		N/A		N/A		N/A	
Schizophrenia	2.39	(0.93 6.14)	N/A		N/A		N/A		N/A	
Substance use	0.95	(0.36 2.51)	N/A		N/A		N/A		N/A	
Other	.91	(0.22 3.70)	N/A		N/A		N/A		N/A	
Physical comorbidity										
Cancer	1.11	(0.56, 2.21)	1.34	(0.26, 6.99)	1.29	(0.21, 7.70)	2.8	(0.77, 10.20)	0.6	(0.14, 2.53)
HIV	0.87	(0.45, 1.69)	0.77	(0.20, 3.01)	1.39	(0.33, 5.84)	0.92	(0.19, 4.40)	0.7	(0.18, 2.74)
Cardiovascular	1.94***	(1.38, 2.72)	1.45	(0.75, 2.81)	2.57	(0.89, 7.41)	1.25	(0.68, 2.29)	3.18**	(1.38, 7.35)
CNS	1.34	(0.98, 1.83)	1.72	(0.88, 3.34)	1.15	(0.48, 2.74)	1.32	(0.75, 2.31)	0.99	(0.49, 2.04)
Developmental	1.91*	(1.07, 3.44)	1.5	(0.45, 5.02)	4.09	(0.66, 25.48)	2.08	(0.75, 5.80)	3.72	(0.54, 25.50)
Hospitalization w/in 12 months	1.13	(0.82, 1.55)	0.6	(0.29, 1.27)	3.40**	(1.47, 7.90)	1.11	(0.63, 1.97)	1.19	(0.57, 2.50)
Admitted from ED	0.84	(0.61, 1.17)	1.8	(0.92, 3.53)	0.48	(0.19, 1.23)	0.72	(0.40, 1.28)	0.55	(0.25, 1.21)
DXCG score	1.32	(0.83, 2.10)	0.67	(0.21, 2.07)	1.76	(0.42, 7.31)	1.53	(0.56, 4.16)	2.19	(0.59, 8.12)

	All BHDs (N = 1,988)¹		Bipolar (N = 448)¹		Depressive (N = 395)¹		Schizoph./Other psych. (N = 480)¹		Substance Use (N = 441)¹	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Type of hospital										
Acute hospital	Ref.		Ref.		Ref.		Ref.		Ref.	
Chronic hospital	1.00	(0.23, 4.25)	N/A		N/A		N/A		N/A	
Psychiatric hospital	0.93	(0.64, 1.34)	2.12*	(1.03, 4.37)	1.35	(0.54, 3.42)	0.47*	(0.24, 0.93)	0.62	(0.22, 1.77)
Semi-Acute hospital	1.04	(0.43, 2.52)	N/A		N/A		N/A		0.91	(0.34, 2.46)

* p<0.05 ** p<0.01 *** p<0.001

¹Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010

3.2 Comparison of Behavioral Health Hospitalizations between MassHealth Plans (FFS, MCOs, and PCCP)

The findings on the comparative analysis of behavioral health hospitalizations for MassHealth plans (FFS, MCO, and PCCP) are presented in the following order:

- 1) Overview of behavioral health hospitalizations,
- 2) Hospitalizations, readmission, and payments,
- 3) Patient characteristics,
- 4) Characteristics of behavioral health hospitalizations,
- 5) Comparison of length of stay between plans, and
- 6) Comparison of hospital readmission between plans.

3.2.1 Overview of Behavioral Health Hospitalizations

Table 11 provides an overview of FFS, MCO, and PCCP members aged 19-64 with behavioral health hospitalizations and payments in FY 2010. The analysis was based on behavioral health hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. The PCCP had the highest percentage of members with behavioral health hospitalizations (2.3%), followed by the MCO (0.7%) and FFS (0.4%) plans. The number of behavioral health hospitalizations per 1,000 members was 41.2 in the PCCP, followed by 10.4 in the MCOs and 6.0 in the FFS plan. For FFS members, the analysis only included those behavioral health hospitalizations paid only by MassHealth, which resulted in fewer behavioral health hospitalizations in FFS members.

Table 11. Overview of Behavioral Health Hospitalizations and Payments in FY 2010, by Health Plan, for Adult FFS, MCO, and PCCP Members

Item	FFS ^{1,2}	MCOs ^{1,3}	PCCP ^{1,4}
Number of members	470,088	449,633	306,962
Members with BHD hospitalizations	1,831	3,115	7,035
Number of BHD hospitalizations	2,836	4,675	12,640
Number of inpatient days	31,560	36,914	107,505
BHD hospitalizations per 1,000 members	6.0	10.4	41.2
MassHealth BHD hospital payments	\$19,289,671	\$24,464,162	\$90,756,990

¹ Based on hospitalizations with discharge dates in FY2010 and admission dates in FY 2009 or FY 2010.

² Includes FFS members aged 19 – 64 with hospitalizations paid only by MassHealth.

³ Includes members of Boston Medical Center HealthNet, Fallon Community Health, Neighborhood Health, and Network Health plans, aged 19 - 64.

⁴ Includes Primary Care Clinician Plan members aged 19-64.

3.2.2 Hospitalizations, Readmissions, and Payments

Table 12 provides summary statistics for behavioral health hospitalizations incurred by the study population. Differences between the FFS, MCO, and PCCP plans were mostly statistically significant ($p < 0.01$). On average, the PCCP had the highest number of hospitalizations per member, followed by the FFS and MCO plans.

The average length of stay in FFS members was 11.1 days which was 2.5 and 3 days longer than that in MCO and PCCP members respectively. FFS members also had the highest inpatient days per patient (17.2 days), followed by the PCCP (15.3 days) and MCO (11.9 days) members. The 30-day hospitalization readmission rate in FFS members (16.7%) was 2.4% higher than that in MCO members but 5.6% lower than that in PCCP members.

Payments for behavioral health hospitalizations varied between plans, which might be attributable to their different service arrangement and payment systems. The PCCP had the highest average payments per patient and per hospitalization, followed by the FFS and MCO plans. Additionally, payments per day in the PCCP were higher than that in the FFS and MCO plans.

Table 12. Behavioral Health Hospitalizations, Readmissions, and Payments, by Health Plan, for Adult FFS, MCO, and PCCP Members, FY 2010

Item ²	FFS ¹		MCOs ¹		PCCP ¹	
	N	%	N	%	N	%
Behavioral health hospitalizations						
Hospitalizations per patient						
Mean (SD) ^{2a}	1.55 (1.36)		1.40 (1.08)		1.70 (1.53)	
One	1,359	74.2	2,335	75.0	4,560	64.8
Two	257	14.4	447	14.4	1,281	18.2
Three or more	92	10.4	333	10.7	1,194	17.0
Length of stay per hospitalization						
Mean (SD)	11.1 (15.9)		7.9 (9.0)		8.5 (9.7)	
Median	8		6		6	
1-7 days	1,368	48.2	3,003	64.2	7,889	62.4
8-14 days	917	32.3	1,246	26.7	3,300	26.1
15-21 days	273	9.6	256	5.5	790	6.3
22-30 days	169	6.0	95	2.0	324	2.6
More than 30 days	109	3.8	75	1.6	337	2.7
Inpatient days per hospitalization						
Mean (SD)	17.2 (25.4)		11.9 (16.3)		15.3 (20.5)	
Median	9		7		8	
1-7 days	706	38.6	1,671	53.6	3,215	45.7
8-14 days	520	28.4	785	25.2	1,772	25.2
15-30 days	190	10.4	276	8.9	717	10.2
31-60 days	159	8.7	155	5.0	480	6.8
More than 60 days	256	14.0	228	7.3	851	12.1
Hospital readmissions for behavioral health disorders						
Percentage of patients readmitted						
Within 30 days ^{2a}	306	16.7	446	14.3	1,571	22.3
Within 60 days ^{2a}	360	19.7	558	17.9	1,859	26.4
Within 90 days ^{2a}	398	21.7	620	19.9	2,036	28.9
Days between discharge and readmission						
Mean (SD)	45.7 (58.6)		51.5 (62.8)		48.0 (59.7)	
Median	23		25		23	
Payments for behavioral health hospitalizations						
Total payment	19,289,671		24,464,162		90,756,990	
Total payments per patient						
Mean (SD)	10,627 (15.7K)		7,854 (10.9K)		12,901 (18.0K)	
Median	6,392		4,768		6,750	
Total payments per hospitalization						
Mean (SD) ^{2b}	6,861 (9.6K)		5,233 (5.5K)		7,180 (8.4K)	
Median	5,293		3,900		4,627	
Total payments per day						
Mean (SD)	617 (1.3K)		663 (1.3K)		884 (0.9K)	
Median	556		596		712	

¹ Includes hospitalizations for adults aged 19-64 with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS hospitalizations include those paid only by MassHealth.

² Unless otherwise specified, differences between plans were statistically significant ($p < 0.01$).

2a. Comparisons between FFS and MCOs: hospitalizations per patient ($p=0.21$), hospital readmission ($p=0.02$ for within 30 days, $p=0.13$ for within 60 days, and $p=0.12$ for within 90 days).

2b. Comparisons between FFS and PCCP: total payment per hospitalization ($p=0.08$).

3.2.3 Patient Characteristics

Table 13 presents patient characteristics of MassHealth FFS, MCO, and PCCP members with behavioral health hospitalization discharged in FY 2010 (N=1,831, 3,115, and 7,035, respectively). FFS members were older and more likely to have a disability, be affiliated with DMH, be dually eligible for Medicare and Medicaid, and stay in long-term care facilities 90 days or longer than were MCO and PCCP members. MCO members were more likely to be female and to have co-occurring mental illness and substance use disorders. While most FFS and MCO members had MassHealth Standard coverage, only two-thirds of PCCP members had the same coverage. As in behavioral health hospitalizations, differences between the FFS, MCO, and PCCP members were mostly statistically significant ($p < 0.01$).

Table 13. Characteristics of Members with Behavioral Health Hospitalizations, by Health Plan, for Adult FFS, MCO, and PCCP Members, FY 2010

Table 1. Characteristics of Adult FFS, MCO, and PCCP Members, FY 2010						
Characteristic ²	FFS ¹ (N=1,831)		MCOs ¹ (N=3,115)		PCCP ¹ (N=7,035)	
	N	%	N	%	N	%
Demographics						
Age, mean (SD)	41.5 (12.3)		36.6 (11.0)		37.3 (11.8)	
Age group						
19-34	633	34.6	1,513	48.6	3,219	45.8
35-44	408	22.3	853	27.4	1,727	24.6
45-54	499	27.3	556	17.9	1,572	22.4
55-64	291	15.9	193	6.2	517	7.4
Gender						
Female	884	48.3	1,981	63.6	3,103	44.1
Race/ethnicity ^{2a}						
White	987	53.9	1,805	58.0	4,041	57.4
Black	155	8.5	255	8.2	633	9.0
Hispanic	141	7.7	294	9.4	596	8.5
Other	34	1.9	59	1.9	115	1.6
Unknown	514	28.1	702	22.5	1,650	23.5
Disability ³						
Yes	739	40.3	716	23.0	1,297	18.4
≥ 90 days in a long-term care facility in the past 12 months	144	7.9	3	0.0	37	0.5
DMH Affiliation and Insurance Coverage						
DMH affiliation	465	25.4	309	9.92	1,286	18.3
Health Insurance coverage						
MassHealth only ^{2a}	1327	72.5	3,077	98.8	6,959	98.9
Dual eligible (MassHealth+Medicare) ^{2a}	560	30.6	160	1.6	292	2.9
MassHealth coverage type						
Standard	1,578	86.2	2,672	85.8	4,446	63.2
CommonHealth Benefit Plan	78	4.3	19	0.6	27	0.4
Other	175	9.6	424	13.6	2,562	36.4
Enrollment days, mean (SD)	261 (124)		300 (97)		311 (88)	
Illness Burden						
DxCG score (FY 2009), mean (SD)	0.92 (0.43)		0.87 (0.33)		0.97 (0.31)	
Co-occurring mental illness and SUDs ⁵	716	39.1	1,629	52.3	3,163	45.0

¹ Includes adults aged 19-64 who had behavioral health hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS members include those with hospitalizations paid only by MassHealth.

² Unless otherwise specified, differences between plans were statistically significant ($p < 0.01$).

^{2a} Comparisons between MCOs and PCCP: race/ethnicity ($p=0.13$), MassHealth only ($p=0.54$), and dual eligible ($p=0.03$).

³ Disability determined by the Social Security Administration or Massachusetts Disability Evaluation Services.

⁵ Based on principal diagnosis only. The number of people with dual diagnosis increased when other diagnoses were also considered: 1,178 (64.3%) for FFS, 2,215 (71.1%) for MCOs, and 4,545 (67.2%) for PCCP.

3.2.4 Hospitalization Characteristics

Table 14 presents the principal diagnosis of behavioral health hospitalizations for the FFS, MCO, and PCCP plans. A significantly higher proportion of FFS hospitalizations were for schizophrenia/other psychotic disorders (26.2%) and substance use disorders (23.2%) than in the MCOs (11.0% and 19.7%) and PCCP (21.2% and 15.2%). In contrast, the proportions of hospitalizations attributable to bipolar disorders and depressive disorders in the MCOs (30.4% and 29.6%) and PCCP (33.7% and 23.4%) were much higher than in the FFS plan (24.5% and 19.5%).

In addition to principal diagnosis, Table 14 shows the types of hospital where care was received, the source of admission, and the discharge location. The most common type of hospital providing behavioral health inpatient care to adult MassHealth FFS members was acute inpatient hospitals (59.6%), followed by psychiatric inpatient hospitals (36.5%). In contrast, similar proportions of behavioral health hospitalizations for PCCP members occurred in acute inpatient hospitals (48.6%) and inpatient psychiatric hospitals (47.6%). However, the types of hospitals providing inpatient care were not compared to MCOs because the coding for this variable in MCO encounter data was not consistent with the FFS plan and the PCCP.

The source of admission and the discharge location were based on information from hospital claims data and were not verified with additional data sources. Additionally, coding of these two variables was different across MassHealth plans. Therefore, no comparison was made for these two variables.

For additional information comparing behavioral health hospitalizations for FFS, MCO and PPCP members, see Appendix D, which includes a bivariate analysis of relationships between health plans, length of stay, readmission, and diagnosis.

Table 14. Characteristics of Behavioral Health Hospitalizations, by Health Plan, for Adult FFS, MCO, and PCCP Members, FY 2010

Characteristic	FFS ¹ (N = 2,836)		MCOs ¹ (N = 4,675)		PCCP ¹ (N = 12,640)	
	N	%	N	%	N	%
Principal diagnosis						
Anxiety disorders	97	3.4	293	6.3	501	4.0
Delirium/dementia	35	1.2	12	0.3	9	0.1
Bipolar disorders	695	24.5	1,419	30.4	4,265	33.7
Depressive disorders	554	19.5	1,382	29.6	2,954	23.4
Schizophrenia	744	26.2	513	11.0	2,680	21.2
Substance use disorders	657	23.2	920	19.7	1,921	15.2
Others	54	1.9	136	2.9	310	2.5
Type of hospital						
Acute inpatient hospital	1,690	59.6	1,768	37.8	6,137	48.6
Psychiatric inpatient hospital	1,036	36.5	755	16.1	6,021	47.6
Chronic inpatient hospital	4	0.1	N/A		N/A	
Semi-acute inpatient hospital	106	3.7	N/A		N/A	
Mental health facilities	N/A		983	21.0	N/A	
Mental health/chemical dep. (NEC)	N/A		405	8.7	N/A	
Other	N/A		764	16.3	482	3.8
Source of admission						
Medical referral ²	1,480	52.2	1,204	25.8	4,008	31.7
Emergency room	909	32.1	368	16.3	1,886	8.0
Transfer from one unit to another – same hospital	18	0.6	11	0.2	0	0
Transfer from other facility ³	353	12.5	222	4.7	1,370	10.8
Court/law enforcement	1	0.0	4	0.1	6	0.0
Non-health care facility point of origin	N/A		666	14.2	2,662	21.1
Reserved for assignment by the NUBC	N/A		498	10.7	1,663	13.2
Information not available	75	2.6	1,702	36.4	1,045	8.3
Discharge location						
Home	2,428	85.6	1,351	28.9	4,289	33.9
Acute care hospital	74	2.6	24	0.5	153	1.2
Post-acute care facility	185	6.5	15	0.3	50	0.4
Psychiatric hospital	45	1.6	22	0.5	220	1.7
Left against medical advice	100	3.4	29	0.6	75	0.6
Patient died	4	1.3	8	0.2	0	0
Other	N/A		3,226	69.0	7,853	62.1

¹ Includes behavioral health hospitalizations for adults aged 19-64 with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS hospitalizations include those paid only by MassHealth.

3.2.5 Differences in Behavioral Health Hospital Length of Stay between Plans

Table 15 shows the relationship between plans (FFS, MCOs, and PCCP) and hospital LOS for BHDs after adjusting for member characteristics and disease burden. When all BHDs were included in the analysis, hospital LOS in the MCOs and PCCP was 1.1 to 1.4 days shorter than in the FFS plan ($p < 0.001$). For the diagnosis-specific analysis, hospital LOS in the MCOs and PCCP was 1.2 to 2.6 days significantly shorter than in the FFS plan; the only exception was depressive disorders in which there was no significant difference in LOS between plans. Notably, hospitalizations for schizophrenia and other psychotic disorders in the MCOs and PCCP and hospitalizations for SUDs in the PCCP were two or more days significantly shorter than in the FFS plan.

Table 15. Comparison of Behavioral Health Hospital Length of Stay for Adult FFS, MCO, and PCCP Members, FY 2010

Model for Length of Stay ¹	FFS	MCOs		PCCP	
		Estimate	95% CI	Estimate	95% CI
All diagnoses	Ref.	-1.10	(-1.65, -0.56)**	-1.39	(-1.90, -0.86)**
Bipolar	Ref.	-1.16	(-2.07, -0.25)*	-1.38	(-2.24, -0.52)**
Depressive	Ref.	-0.20	(-1.07, 0.67)	-0.19	(-1.05, 0.68)
Schizophrenia	Ref.	-2.25	(-4.33, -0.17)*	-2.56	(-4.32, -0.79)**
Substance Abuse	Ref.	-0.83	(-1.66, 0.00)	-2.31	(-3.20, -1.43)**

¹ Includes behavioral health hospitalizations for adults aged 19-64 with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS hospitalizations include those paid only by MassHealth.

* $p < 0.05$, ** $p < 0.01$

3.2.6 Differences in Behavioral Health Hospital Readmission between Plans

Table 16 presents results from the analysis on the relationship between plans and hospital readmission for BHDs within 30 days, after adjusting for member characteristics and disease burden. While the odds of hospital readmission were not significantly different between MCO and FFS members, the odds of being readmitted within 30 days among PCCP members were approximately two to three times significantly higher than among FFS members, except for index hospitalizations with schizophrenia as the principal diagnosis.

Table 16. Comparison of Behavioral Health Hospital Readmissions for Adult FFS, MCO, and PCCP Members, FY 2010

Model for Readmission ¹	FFS	MCOs		PCCP	
		OR	95% CI	OR	95% CI
All diagnoses	Ref.	0.95	(0.77, 1.16)	1.89	(1.55, 2.30)**
Bipolar	Ref.	1.16	(0.78, 1.71)	1.76	(1.21, 2.55)**
Depressive	Ref.	1.29	(0.81, 2.05)	2.94	(1.85, 4.66)**
Schizophrenia	Ref.	0.67	(0.41, 1.07)	1.34	(0.91, 1.96)
Substance Abuse	Ref.	0.69	(0.43, 1.10)	1.99	(1.20, 3.30)**

¹ Includes behavioral health hospitalizations for adults aged 19-64 with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS hospitalizations include those paid only by MassHealth.

* $p < 0.05$, ** $p < 0.01$

4 Discussion and Conclusions

The main purpose of this study is to assist in the development of a utilization management program for FFS behavioral health hospitalizations. In addition to describing FFS behavioral health hospitalizations paid only by MassHealth, this study identified factors associated with long LOS and increased risk of hospital readmission, which are significant contributors to the cost of behavioral health care and can be indicators of inefficient treatment or inadequacy of community-based aftercare services. Behavioral health hospitalizations for FFS members were also compared to those for MCO and PCCP members, which were subject to structured utilization management practices.

Although the average LOS continued to decrease across years, over 20% of FFS behavioral health hospitalizations in FY 2010 were longer than 14 days. Even after excluding FFS behavioral health hospitalizations for older adults, which were dominated by long stays for dementia, the proportion of hospitalizations longer than 14 days remained nearly 20%. In contrast, this proportion was only approximately 10% in behavioral health hospitalizations for MCO and PCCP members. Furthermore, after adjusting for member characteristics and disease burden, hospital LOS for FFS members was found to be one to two and a half days significantly longer than that for MCO and PCCP members for all diagnoses, except depressive disorders.

It is possible that the utilization management practices used by the MCOs and PCCP contribute to the difference in LOS. For example, all behavioral health hospital admissions for MCO and PCCP members are evaluated through the Emergency Services Program and approved by the health plan. After admissions are approved, the managed care plans conduct concurrent reviews during hospitalization and offer care management programs to assist with discharge planning and facilitate the use of community-based services. Although it is out of the scope of this study and no data are available to examine the contribution of each of these practices to LOS, these are components to be considered in the development of a utilization management programs for FFS behavioral health hospitalizations.

Hospital readmission for behavioral health disorders was common among FFS members. Approximately a quarter of FFS members with behavioral health hospitalizations experienced two or more hospitalizations in FY 2010. Also, the 30-day hospital readmission rate has remained stable at nearly 16% despite decreased LOS over years for FFS members. The likelihood of hospital readmission within 30 days was not significantly different between MCO and FFS members, but the adjusted odds for PCCP members to be readmitted were two to three times higher than for FFS members, except for those being hospitalized for schizophrenia initially where the two groups were similar. The readmission rate for FFS members might have been higher if behavioral health hospitalizations paid by other payers had been considered for the index hospitalization and the readmission. For example, the first report, which described FFS hospitalizations covered by all payers, showed a 30-day readmission rate that is comparable to the rate for PCCP members found in the current report.

It is possible that the LOS of FFS behavioral health hospitalizations can be further decreased to be closer to the LOS for MCO and PCCP hospitalizations; however, it is unknown to what extent

the LOS can be shortened without increased adverse outcomes such as hospital readmissions. Findings from existing literature are inconclusive regarding the relationship between LOS and readmissions (Figueroa, Harman, & Engberg, 2004; Korkeila, Lehtinen, Tuori, & Helenius, 1998; Lyons, O'Mahoney, Miller, Neme, Kabat, et al., 1997; Thompson, Neighbors, Munday, & Trierweiler, 2003; Wickizer & Lessler, 1998). In a further analysis for this report, adjusting for hospital LOS did not mitigate the significant difference in the likelihood of readmission between FFS and PCCP members, suggesting that factors beyond the scope of this study are contributing to this difference. Examples of these potential factors include severity of illness, family and social support, discharge planning, and follow-up services in the community, which were mostly not available from claims data.

A blanket approach to shorten LOS might not be efficient since nearly half of FFS behavioral health hospitalizations paid only by MassHealth were already 7 days or shorter and another 30% were between 8 to 14 days. An alternative is to identify FFS members at risk of staying in the hospital for a longer period or those at risk of hospital readmission, and to devise care plans for these individuals to use resources more efficiently. The study identified several factors associated with significantly increased odds of long LOS for FFS members. These included older age, being dually eligible for Medicare and Medicaid, being affiliated with DMH, and being hospitalized for schizophrenia or dementia. Additionally, younger members and members with co-occurring mental illness and SUD experienced significantly increased odds of 30-day hospital readmission for any BHDs. Members with characteristics associated with long LOS or hospital readmission might benefit from more intensive care management and discharge planning to help transition to and stay in the community.

Several limitations are worth noting and warrant special attention in interpreting findings from this study. First, focusing on behavioral health hospitalizations paid only by MassHealth for FFS members might underestimate inpatient utilization for FFS members who are dually eligible for Medicare and Medicaid or who are affiliated with DMH. Second, data structure and variable definitions are different between claims data for FFS members and encounter data for MCOs and PCCP members. Although the algorithm for identifying hospitalizations has been modified to accommodate these differences, the adaptation might not fully address these differences. Third, variables included in regression models might not fully adjust for differences between FFS, MCO, and PCCP members. In addition to member characteristics, several variables related to disease severity were included in the analysis, such as disability, dual eligibility, DMH affiliation, overall disease burden, and co-occurring mental illness and SUD. However, the level of functional impairment was not available for the analysis.

A significant proportion of FFS behavioral health hospitalizations had long stays, and readmission for behavioral health disorders was common for FFS members. Utilization management efforts could focus on people with characteristics associated with long LOS or increased risk of hospital readmission. For example, prior authorization and utilization management practices might take different approaches depending on the age, eligibility status, diagnosis, and co-occurring conditions of patients. Understanding these risk factors can help inform actions taken to help transition to the community and avoid multiple hospitalizations.

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Appendix A ICD-9-CM Codes for Behavioral Health Disorders

- Anxiety disorders
29384 30000 30001 30002 30009 30010 30020 30021 30022 30023 30029 3003 3005
30089 3009 3080 3081 3082 3083 3084 3089 30981 3130 3131 31321 31322 3133 31382
31383
- Delirium, dementia, and amnestic and other cognitive disorders
2900 29010 29011 29012 29013 29020 29021 2903 29040 29041 29042 29043 2908 2909
2930 2931 2940 2941 29410 29411 2948 2949 3100 3102 3108 3109 3310 3311 33111
33119 3312 33182 797
- Mood disorders
 - Bipolar disorders
29600 29601 29602 29603 29604 29605 29606 29610 29611 29612 29613 29614
29615 29616 29640 29641 29642 29643 29644 29645 29646 29650 29651 29652
29653 29654 29655 29656 29660 29661 29662 29663 29664 29665 29666 2967 29680
29681 29682 29689 29690 29699
 - Depressive disorders
29383 29620 29621 29622 29623 29624 29625 29626 29630 29631 29632 29633
29634 29635 29636 3004 311
- Schizophrenia and other psychotic disorders
29381 29382 29500 29501 29502 29503 29504 29505 29510 29511 29512 29513 29514
29515 29520 29521 29522 29523 29524 29525 29530 29531 29532 29533 29534 29535
29540 29541 29542 29543 29544 29545 29550 29551 29552 29553 29554 29555 29560
29561 29562 29563 29564 29565 29570 29571 29572 29573 29574 29575 29580 29581
29582 29583 29584 29585 29590 29591 29592 29593 29594 29595 2970 2971 2972 2973
2978 2979 2980 2981 2982 2983 2984 2988 2989
- Substance use disorders
 - Alcohol-related disorders
2910 2911 2912 2913 2914 2915 2918 29181 29182 29189 2919 30300 30301 30302
30303 30390 30391 30392 30393 30500 30501 30502 30503 76071 9800
 - Substance-related disorders
2920 29211 29212 2922 29281 29282 29283 29284 29285 29289 2929 30400 30401
30402 30403 30410 30411 30412 30413 30420 30421 30422 30423 30430 30431
30432 30433 30440 30441 30442 30443 30450 30451 30452 30453 30460 30461
30462 30463 30470 30471 30472 30473 30480 30481 30482 30483 30490 30491
30492 30493 30520 30521 30522 30523 30530 30531 30532 30533 30540 30541
30542 30543 30550 30551 30552 30553 30560 30561 30562 30563 30570 30571
30572 30573 30580 30581 30582 30583 30590 30591 30592 30593 64830 64831
64832 64833 64834 65550 65551 65553 76072 76073 76075 7795 96500 96501 96502
96509 V6542

- Other disorders
 - Adjustment disorders
3090 3091 30922 30923 30924 30928 30929 3093 3094 30982 30983 30989 3099
 - Attention-deficit, conduct, and disruptive behavior disorders
31200 31201 31202 31203 31210 31211 31212 31213 31220 31221 31222 31223 3124
3128 31281 31282 31289 3129 31381 31400 31401 3141 3142 3148 3149
 - Developmental disorders
3070 3079 31500 31501 31502 31509 3151 3152 31531 31532 31534 31535 31539
3154 3155 3158 3159 317 3180 3181 3182 319 V400 V401
 - Disorders usually diagnosed in infancy, childhood, or adolescence
29900 29901 29910 29911 29980 29981 29990 29991 30720 30721 30722 30723 3073
3076 3077 30921 31323 31389 3139
 - Impulse control disorders, NEC
31230 31231 31232 31233 31234 31235 31239
 - Personality disorders
3010 30110 30111 30112 30113 30120 30121 30122 3013 3014 30150 30151 30159
3016 3017 30181 30182 30183 30184 30189 3019
 - Miscellaneous disorders
29389 2939 30011 30012 30013 30014 30015 30016 30019 3006 3007 30081 30082
3021 3022 3023 3024 30250 30251 30252 30253 3026 30270 30271 30272 30273
30274 30275 30276 30279 30281 30282 30283 30284 30285 30289 3029 3060 3061
3062 3063 3064 30650 30651 30652 30653 30659 3066 3067 3068 3069 3071 30740
30741 30742 30743 30744 30745 30746 30747 30748 30749 30750 30751 30752
30753 30754 30759 30780 30781 30789 3101 316 64840 64841 64842 64843 64844
V402 V403 V409 V673

Appendix B FFS Behavioral Health Hospitalizations Excluded from the Study Population

Table 17. Characteristics of FFS Behavioral Health Hospitalizations Excluded From the Analysis

Hospitalizations	Admitted Before 7/1/2008 and Discharged in FY 2010 (N=97)		Admitted Before 7/1/2009 and NOT Discharged in FY 2010 (N=234)		Admitted in FY 2010 and NOT discharged in FY 2010 (N=284)	
	N	%	N	%	N	%
Principal Diagnosis						
Anxiety	0	0	2	0.85	2	0.7
Dementia	83	85.57	172	73.5	132	46.48
Bipolar	2	2.06	16	6.84	41	14.44
Depressive	8	8.25	20	8.55	35	12.32
Schizophrenia/other	3	3.09	17	7.26	56	19.72
Substance use	1	1.03	2	0.85	15	5.28
Other	0	0	5	2.14	3	1.06
Type of Hospital						
Acute inpatient	0	0	3	1.28	49	17.25
Chronic inpatient	94	96.91	227	97.01	150	52.82
Psychiatric inpatient	3	3.09	4	1.71	81	28.52
Semi-acute	0	0	0	0	4	1.41
Discharge Location						
Home	8	8.3	NA	NA	NA	NA
Acute care hospital	20	20.6				
Post-acute care facility	6	6.2				
Patient died	63	65.0				
Hospital Days and Payments in FY 2010¹						
Average hospital days in FY 2010 (mean, SD)	149.2	(105.8)	305.0	(112.8)	116.3	(132.8)
Total payments in FY 2010	\$4,471,609		\$23,995,465		\$10,320,395	
Hospital Days and Payments from Date of Admission through FY 2010²						
Average hospital days (mean, SD)	1,648	(1,040)	1,417	(1,103)	100	(98)

¹ The start date is based on the first service date in 2010. The end date is based on the last MassHealth inpatient claim recorded in the database.

² The start date is based on the original hospitalization admission date regardless of payer. The end date is based on the last MassHealth inpatient claim recorded in the database.

Table 18. Patient Characteristics of FFS Behavioral Health Hospitalizations Excluded From the Analysis

Characteristic	Admitted Before 7/1/2008 and Discharged in FY 2010 (N=97)		Admitted Before 7/1/2009 and NOT Discharged in FY 2010 (N=234)		Admitted in FY 2010 and NOT Discharged in FY 2010 (N=284)	
	N	%	N	%	N	%
Age						
Mean (SD)	85.7 (12.1)		81.0 (16.5)		65.67 (25.18)	
Age group						
19-34	1	1.0	9	3.9	48	16.9
35-44	0	0.0	6	2.6	25	8.8
45-54	1	1.0	5	2.1	35	12.3
55-64	4	4.1	12	5.1	32	11.3
65-74	12	12.4	21	9.0	9	3.2
75 and older	79	81.4	181	77.4	135	47.5
Gender						
Female	68	70.1	158	67.5	194	68.3
DMH affiliation						
Yes	0	0	4	1.7	58	20.4
Health Insurance coverage						
MassHealth only	5	5.2	25	10.7	85	29.9
Dual eligible	92	95.0	208	91.6	196	71.3
Disability ¹						
Yes	2	2.0	9	3.9	70	25.7

¹ Disability determined by the Social Security Administration or Massachusetts Disability Evaluation Services

Appendix C Bivariate Analysis of Behavioral Health Hospitalizations for FFS Plan Members

This appendix provides a bivariate analysis of variables associated with behavioral health hospitalizations paid only by MassHealth for Fee-For-Service (FFS) members. Figures and tables are presented to show the following relationships:

- Principal diagnosis, age, and gender
- Principal Diagnosis, type of hospital, and admission source
- Length of stay, principal diagnosis, and type of hospital
- Hospital readmission, diagnosis, and type of hospital

Appendix C.1 Principal Diagnosis, Age, and Gender

Figure 2. Frequency of Selected Principal Diagnoses for Hospitalizations Paid Only by MassHealth for Adult FFS Members, by Age Group, FY 2010

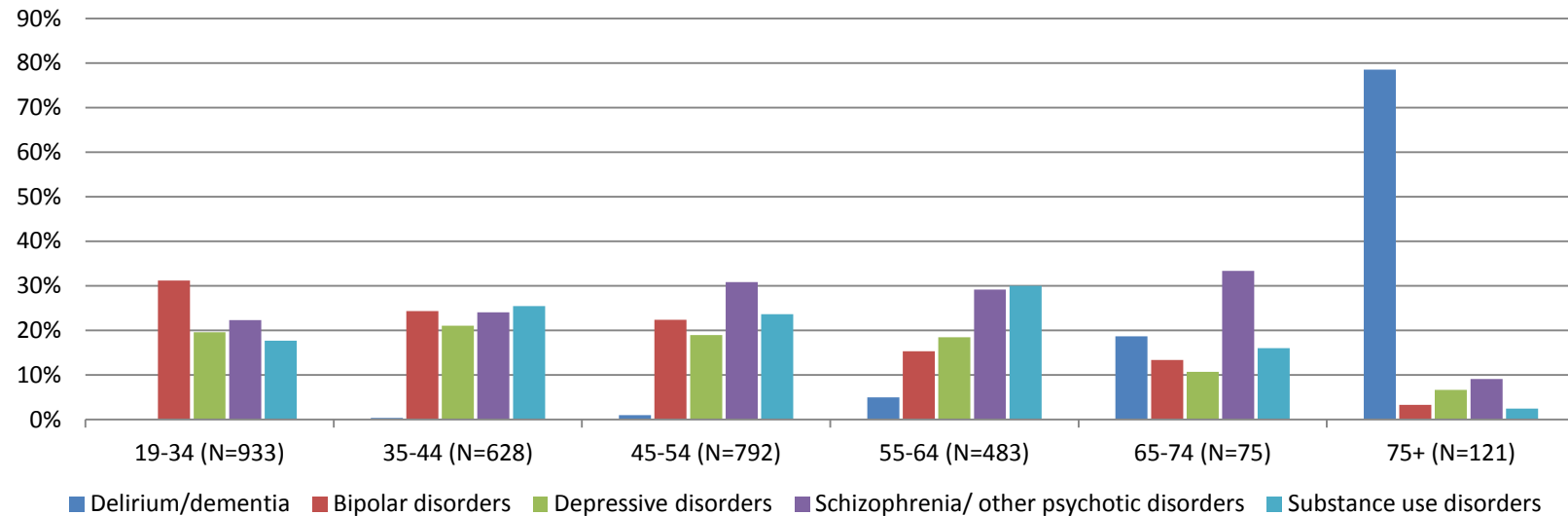
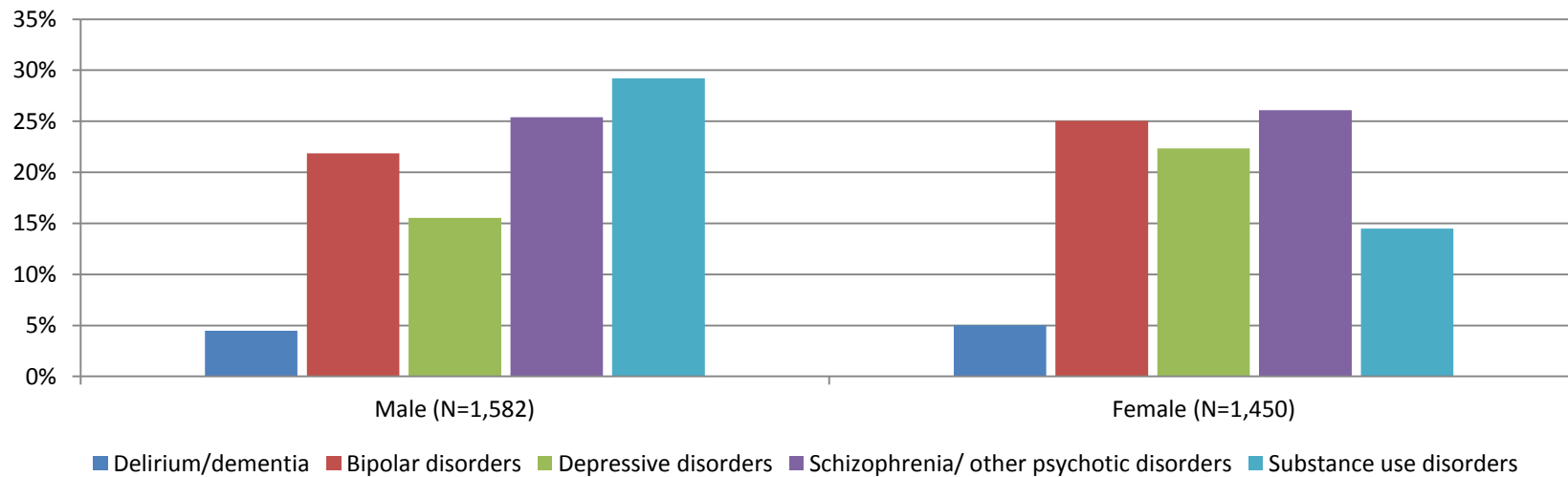


Table 19. Behavioral Health Hospitalizations Paid Only by MassHealth, by Principal Diagnosis and Age Group, for Adult FFS Members, FY 2010

Principal Diagnosis	Age 19-34 ¹ (N=933)		Age 35-44 ¹ (N=628)		Age 45-54 ¹ (N=792)		Age 55-64 ¹ (N=483)		Age 65-74 ¹ (N=75)		Age 75+ ¹ (N=121)	
	N	%	N	%	N	%	N	%	N	%	N	%
Anxiety disorders	55	5.9	25	4.0	11	1.4	6	1.2	5	6.7	0	0.0
Delirium/dementia	1	0.1	2	0.3	8	1.0	24	5.0	14	18.7	95	78.5
Bipolar disorders	291	31.2	153	24.4	177	22.4	74	15.3	10	13.3	4	3.3
Depressive disorders	183	19.6	132	21.0	150	18.9	89	18.4	8	10.7	8	6.6
Schizophrenia/ other psychotic disorders	208	22.3	151	24.0	244	30.8	141	29.2	25	33.3	11	9.1
Substance use disorders	165	17.7	160	25.5	187	23.6	145	30.0	12	16.0	3	2.5
Other	30	3.2	5	0.8	15	1.9	4	0.8	1	1.3	0	0.0

¹ Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010.

Figure 3. Frequency of Selected Principal Diagnoses for Hospitalizations Paid Only by MassHealth for Adult FFS Members, by Gender, FY2010**Table 20. Behavioral Health Hospitalizations Paid Only by MassHealth, by Principal Diagnosis and Gender, for Adult FFS Members FY 2010**

Principal Diagnosis	Male ¹ (N=1,582)		Female ¹ (N=1,450)	
	N	%	N	%
Anxiety disorders	26	1.6	76	5.2
Delirium/dementia	71	4.5	73	5.0
Bipolar disorders	346	21.9	363	25.0
Depressive disorders	246	15.6	324	22.3
Schizophrenia/ other psychotic disorders	402	25.4	378	26.1
Substance use disorders	462	29.2	210	14.5
Other disorders	29	1.8	26	1.8

¹ Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010.

Appendix C.2 Principal Diagnosis, Type of Hospital, and Admission Source

Figure 4. Frequency of Selected Principal Diagnoses for Hospitalizations Paid Only by MassHealth for Adult FFS Members, by Type of Hospital, FY 2010

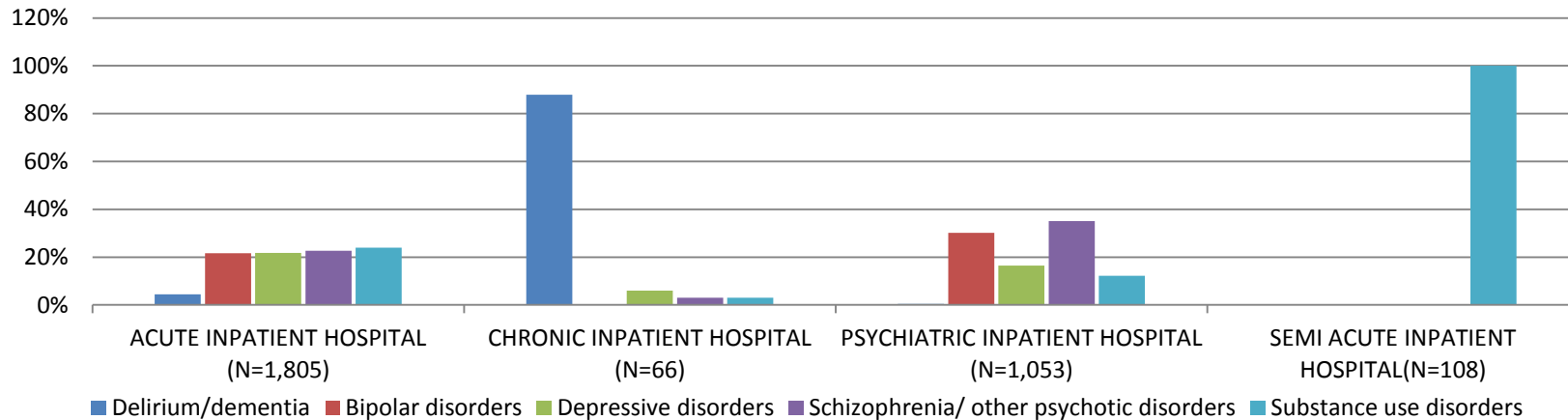


Table 21. Behavioral Health Hospitalizations Paid Only by MassHealth, by Principal Diagnosis and Type of Hospital, for Adult FFS Members, FY 2010

Principal Diagnosis	Acute Inpatient Hospital ¹ (N=1,805)		Chronic Inpatient hospital ¹ (N=66)		Psychiatric Inpatient Hospital ¹ (N=1,053) ¹		Semi-acute Inpatient Hospital ¹ (N=108) ¹	
	N	%	N	%	N	%	N	%
Anxiety disorders	55	3.1	0	0.0	47	4.5	0	0.0
Delirium/dementia	81	4.5	58	87.9	5	0.5	0	0.0
Bipolar disorders	391	21.7	0	0.0	318	30.2	0	0.0
Depressive disorders	393	21.8	4	6.1	173	16.4	0	0.0
Schizophrenia/ other psychotic disorders	409	22.7	2	3.0	369	35.0	0	0.0
Substance use disorders	433	24.0	2	3.0	129	12.3	108	100.0
Other disorders	43	2.4	0	0.0	12	1.1	0	0.0

¹ Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010.

Figure 5. Frequency of Selected Principal Diagnoses for Hospitalizations Paid Only by MassHealth for Adult FFS Members, by Source of Admission, FY 2010

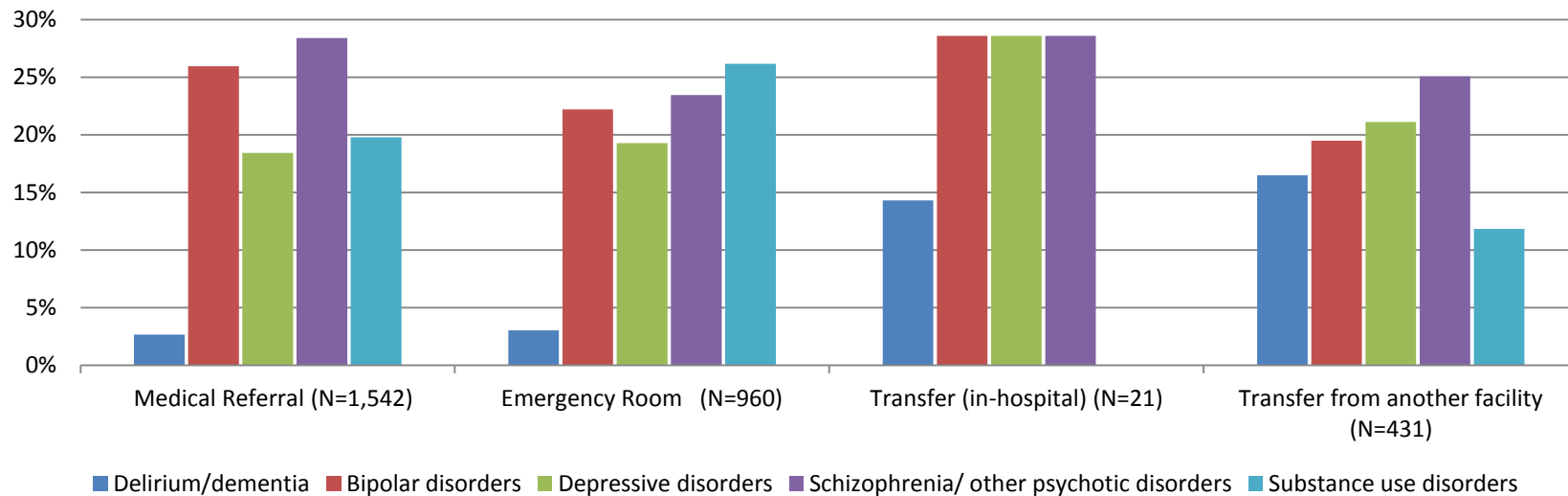


Table 22. Behavioral Health Hospitalizations Paid Only by MassHealth, by Principal Diagnosis and Source of Admission, for Adult FFS Members, FY 2010

Principal Diagnosis	Medical Referral ¹ (N=1,542)		Emergency Room ¹ (N=960)		Transfer (in-hospital) ¹ (N=21)		Transfer from another facility ¹ (N=431)		Court/law Enforcement ¹ (N=1)		Information Not Available ¹ (N=77)	
	N	%	N	%	N	%	N	%	N	%	N	%
Anxiety disorders	53	3.4	37	3.9	0	0.0	12	2.8	0	0.0	0	0.0
Delirium/dementia	41	2.7	29	3.0	3	14.3	71	16.5	0	0.0	0	0.0
Bipolar disorders	400	25.9	213	22.2	6	28.6	84	19.5	0	0.0	6	7.8
Depressive disorders	284	18.4	185	19.3	6	28.6	91	21.1	1	100.0	3	3.9
Schizophrenia/ other psychotic disorders	438	28.4	225	23.4	6	28.6	108	25.1	0	0.0	3	3.9
Substance use disorders	305	19.8	251	26.2	0	0.0	51	11.8	0	0.0	65	84.4
Other	21	1.4	20	2.1	0	0.0	14	3.3	0	0.0	0	0.0

¹ Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010.

Appendix C.3 Length of Stay, Principal Diagnosis, and Type of Hospital

Figure 6. Distribution of Length of Stay of Behavioral Health Hospitalizations Paid Only by MassHealth for Adult FFS Members, by Selected Principal Diagnosis, FY 2010

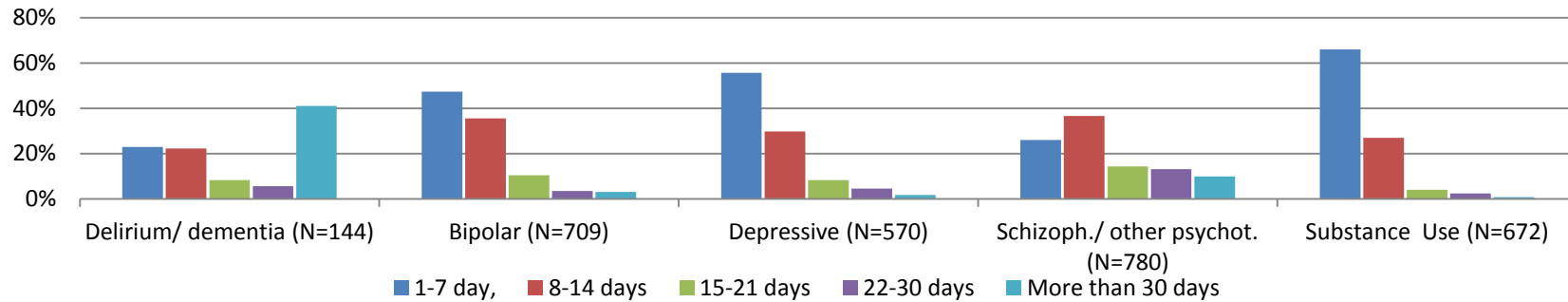


Table 23. Behavioral Health Hospitalizations Paid Only by MassHealth, by Length of Stay and Principal Diagnosis, for Adult FFS Members, FY 2010

Length of Stay	Anxiety ¹ (N=102) ¹		Delirium/ dementia ¹ (N=144)		Bipolar ¹ (N=709)		Depressive ¹ (N=570)		Schizoph./ other psych. ¹ (N=780)		Substance Use ¹ (N=672)		Othe ¹ r (N=55)	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Days per hospitalization														
1-7 day,	53	52.0	33	22.9	336	47.4	317	55.6	203	26.0	443	65.9	34	61.8
8-14 days	29	28.4	32	22.2	252	35.5	170	29.8	286	36.7	181	26.9	15	27.3
15-21 days	12	11.8	12	8.3	74	10.4	47	8.3	112	14.4	27	4.0	3	5.5
22-30 days	6	5.9	8	5.6	25	3.5	26	4.6	102	13.1	16	2.4	0	0.0
More than 30 days	2	2.0	59	41.0	22	3.1	10	1.8	77	9.9	5	0.7	3	5.5
Average length of stay														
Mean (SD)	10 (7.3)		74 (107.2)		11 (19.1)		10 (19.5)		17 (23.5)		7 (5.7)		9 (10.0)	
Median	7		16		8		7		11		6		6	
75% percentile	12		114.5		12		11		20		9		9	
90% percentile	20		218		19		17		30		13		16	

¹ Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010.

Figure 7. Distribution of Length of Stay of Behavioral Health Hospitalizations Paid Only by MassHealth for Adult FFS Members, by Type of Hospital, FY 2010

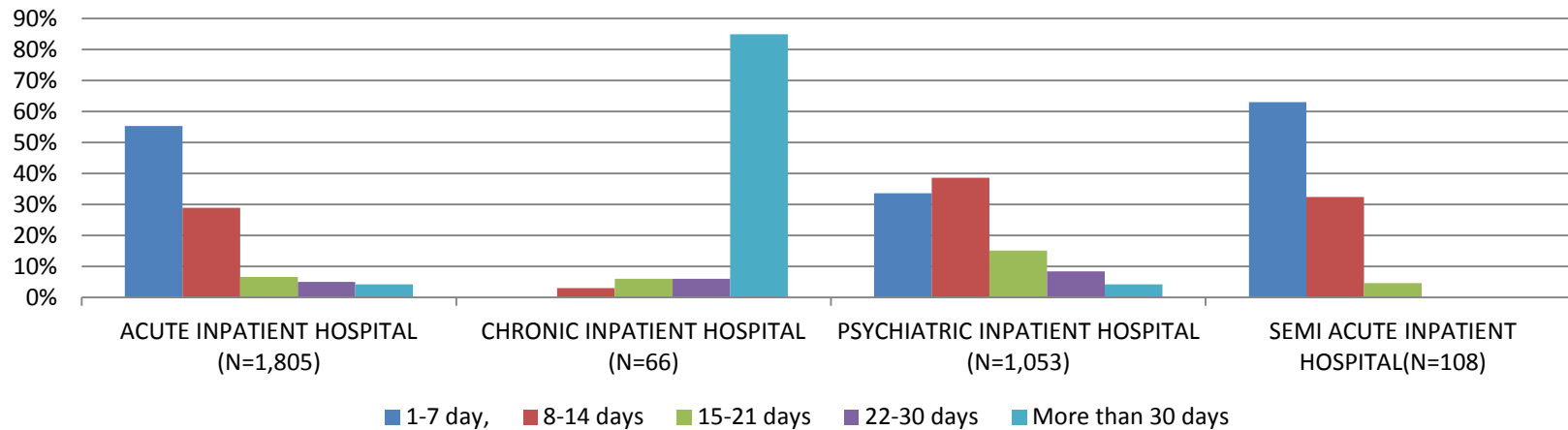


Table 24. Behavioral Health Hospitalizations Paid Only by MassHealth, by Length of Stay and Type of Hospital, for Adult FFS Members, FY 2010

Length of Stay	Acute Inpatient Hospital ¹ (N=1,805)		Chronic Inpatient Hospital ¹ (N=66)		Psychiatric Inpatient Hospital ¹ (N=1,053)		Semi acute Inpatient Hospital ¹ (N=108)	
	N	%	N	%	N	%	N	%
Days per hospitalization								
1-7 days	997	55.2	0	0.0	354	33.6	68	63.0
8-14 days	522	28.9	2	3.0	406	38.6	35	32.4
15-21 days	119	6.6	4	6.1	159	15.1	5	4.6
22-30 days	90	5.0	4	6.1	89	8.5	0	0.0
More than 30 days	77	4.3	56	84.9	45	4.3	0	0.0
Average length of stay								
Mean (SD)	10 (13.6)		157 (131.7)		13 (16.9)		7 (3.8)	
Median	7		127		10		6	
75% percentile	11		218		15		10	
90% percentile	20		319		24		12	

¹ Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010.

Appendix C.4 Hospital Readmission, Diagnosis, and Type of Hospital

Figure 8. Distribution of Behavioral Health Hospital Readmissions Paid Only by MassHealth for Adult FFS Members, by Selected Principal Diagnosis, FY 2010

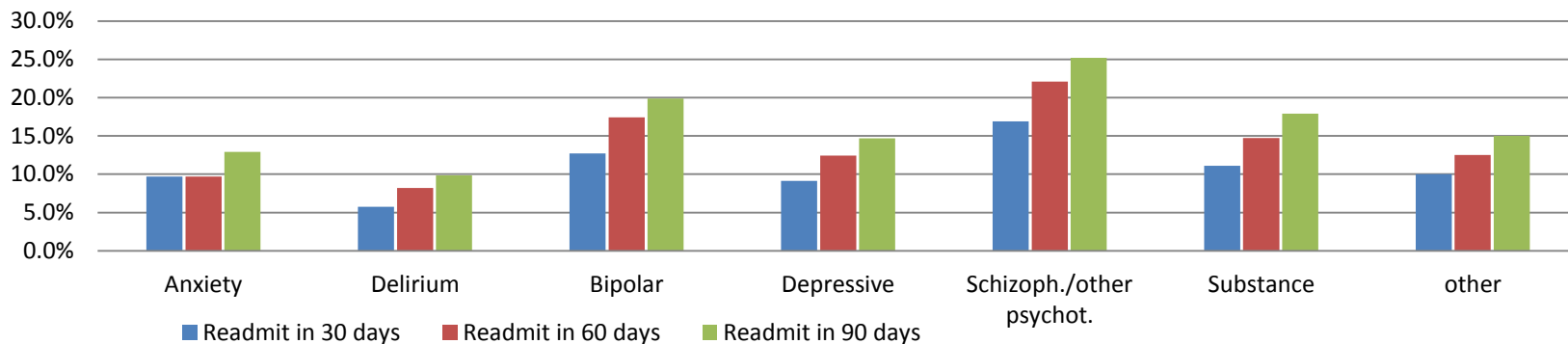
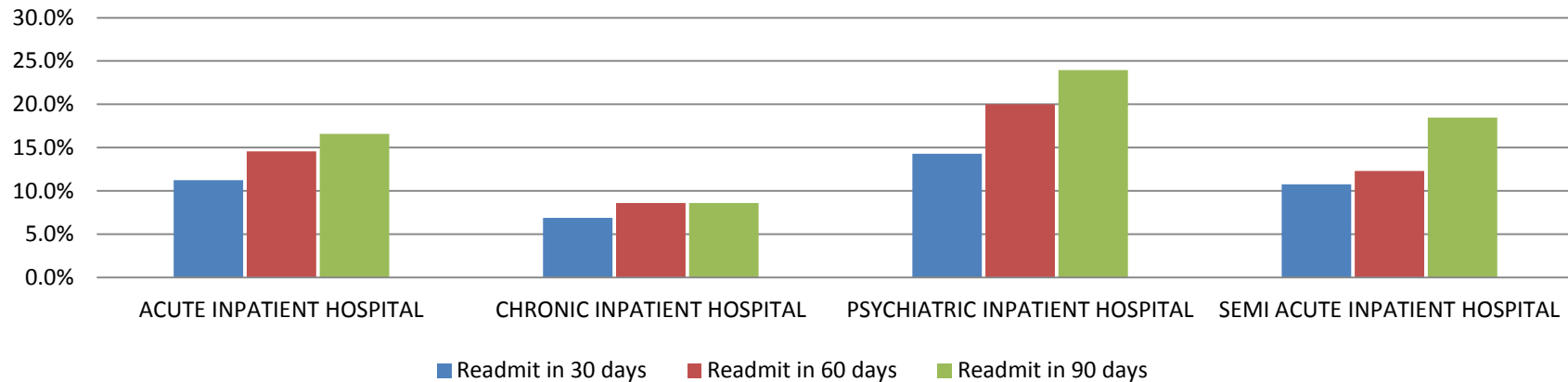


Table 25. Behavioral Health Hospital Readmissions Paid Only by MassHealth, by Length of Stay and Principal Diagnosis, for Adult FFS Members, FY 2010

Readmissions	Anxiety ¹ (N=62)		Delirium/ dementia ¹ (N=122)		Bipolar ¹ (N=448)		Depressive ¹ (N=395)		Schizop./ other psych. ¹ (N=480)		Substance Use ¹ (N=441)		Other ¹ (N=55)	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Total (cumulative)														
Within 30 days	6	9.7	7	5.7	57	12.7	36	9.1	81	16.9	49	11.1	4	10.0
Within 60 days	6	9.7	10	8.2	78	17.4	49	12.4	106	22.1	65	14.7	5	12.5
Within 90 days	8	12.9	12	9.8	89	19.9	58	14.7	121	25.2	79	17.9	6	15.0
Days between discharge and readmission														
1-7	1	1.6	3	2.5	19	4.2	13	3.3	31	6.5	11	2.5	0	0.0
8-14	1	1.6	1	0.8	15	3.3	10	2.5	17	3.5	18	4.1	0	0.0
15-30	4	6.5	3	2.5	23	5.1	13	3.3	33	6.9	20	4.5	4	10.0
31-60	0	0.0	3	2.5	21	4.7	13	3.3	25	5.2	16	3.6	1	2.5
61-90	2	3.2	2	1.6	11	2.5	9	2.3	15	3.1	14	3.2	1	2.5
>90	4	6.5	3	2.5	31	6.9	23	5.8	33	6.9	19	4.3	3	7.5
No readmission	50	80.6	107	87.7	328	73.2	314	79.5	326	67.9	343	77.8	31	77.5

¹ Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010.

Figure 9. Distribution of Behavioral Health Hospital Readmissions Paid Only by MassHealth for Adult FFS Members, by Type of Hospital, FY 2010**Table 26. Behavioral Health Hospital Readmissions Paid Only by MassHealth, by Length of Stay and Type of Hospital, for Adult FFS Members, FY 2010**

Readmission	Acute Inpatient Hospital (N=1,235) ¹		Chronic Inpatient Hospital ¹ (N=58)		Psychiatric Inpatient Hospital ¹ (N=630)		Semi acute Inpatient Hospital ¹ (N=65)	
	N	%	N	%	N	%	N	%
Total (cumulative)								
Within 30 days	139	11.3	4	6.9	90	14.3	7	10.8
Within 60 days	180	14.6	5	8.6	126	20.0	8	12.3
Within 90 days	205	16.6	5	8.6	151	24.0	12	18.5
Days between discharge and readmission								
1-7	47	3.8	2	3.4	29	4.6	0	0.0
8-14	35	2.8	0	0.0	25	4.0	2	3.1
15-30	57	4.6	2	3.4	36	5.7	5	7.7
31-60	41	3.3	1	1.7	36	5.7	1	1.5
61-90	25	2.0	0	0.0	25	4.0	4	6.2
>90	59	4.8	1	1.7	51	8.1	5	7.7
No readmission	971	78.6	52	89.7	428	67.9	48	73.8

¹ Includes hospitalizations with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010.

Appendix D Bivariate Analysis of Behavioral Health Hospitalizations for FFS, MCO, and PCCP Members

This appendix provides a bivariate analysis of variables associated with behavioral health hospitalizations for Fee-For-Service (FFS), managed care organization (MCO), and Primary Care Clinician Plan (PCCP) members. Tables are presented to show the following relationships:

- Length of stay, health plan, and principal diagnosis
- Hospital readmission, health plan, and principal diagnosis

Appendix D.1 Length of Stay, Health Plan, and Principal Diagnosis

Table 27. Hospitalizations for Anxiety Disorders, by Length of Stay and Health Plan, for Adult FFS, MCO, and PCCP Members, FY 2010

Length of Stay	FFS ¹ (N = 97)		MCOs ¹ (N = 293)		PCCP ¹ (N = 501)	
	N	%	N	%	N	%
Days per hospitalization						
1-7 day,	50	51.6	211	72.0	354	70.7
8-14 days	28	28.9	63	21.5	116	23.2
15-21 days	12	12.4	10	3.4	20	4.0
22-30 days	5	5.2	8	2.7	6	1.2
More than 30 days	2	2.1	1	0.3	5	1.0
Average length of stay						
Mean (SD)	9.6 (7.3)		6.6 (5.3)		7.0 (5.1)	
Median	7		5		6	
75% percentile	12		8		8	
90% percentile	20		12		13	

¹ Includes behavioral health hospitalizations for adults aged 19-64 with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS hospitalizations include those paid only by MassHealth.

Table 28. Hospitalizations for Bipolar Disorders, by Length of Stay and Health Plan, for Adult FFS, MCO, and PCCP Members, FY 2010

Length of Stay	FFS ¹ (N = 695)		MCOs ¹ (N = 1,419)		PCCP ¹ (N = 4,265)	
	N	%	N	%	N	%
Days per hospitalization						
1-7 day,	333	47.9	811	57.2	2651	62.2
8-14 days	246	35.4	465	32.8	1207	28.3
15-21 days	73	10.5	85	6.0	247	5.8
22-30 days	25	3.6	32	2.3	86	2.0
More than 30 days	18	2.6	26	1.8	74	1.7
Average length of stay						
Mean (SD)	10.5(16.4)		8.5(7.6)		8.2(7.6)	
Median	8		7		7	
75% percentile	12		9		9	
90% percentile	19		15		14	

¹ Includes behavioral health hospitalizations for adults aged 19-64 with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS hospitalizations include those paid only by MassHealth.

Table 29. Hospitalizations for Depressive Disorders, by Length of Stay and Health Plan, for Adult FFS, MCO, and PCCP Members, FY 2010

Length of Stay	FFS ¹ (N = 554)		MCOs ¹ (N = 1,382)		PCCP ¹ (N = 2,954)	
	N	%	N	%	N	%
Days per hospitalization						
1-7 day,	313	56.5	917	66.4	1,951	66.1
8-14 days	164	29.6	368	26.6	811	27.5
15-21 days	46	8.3	67	4.9	129	4.4
22-30 days	25	4.5	14	1.0	31	1.1
More than 30 days	6	1.1	16	1.2	32	1.1
Average length of stay						
Mean (SD)	8.9(6.5)		7.4(6.2)		7.6(9.1)	
Median	7		6		6	
75% percentile	10		8		9	
90% percentile	16		12		12	

¹ Includes behavioral health hospitalizations for adults aged 19-64 with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS hospitalizations include those paid only by MassHealth.

Table 30. Hospitalizations for Schizophrenia and Other Psychotic Disorders, by Length of Stay and Health Plan, for Adult FFS, MCO, and PCCP Members, FY 2010

Length of Stay	FFS¹		MCOs¹		PCCP¹	
	(N = 744)		(N = 513)		(N = 2,680)	
	N	%	N	%	N	%
Days per hospitalization						
1-7 day,	197	26.5	224	43.7	995	37.1
8-14 days	273	36.7	163	31.8	908	33.9
15-21 days	106	14.3	65	12.7	367	13.7
22-30 days	96	12.9	33	6.4	192	7.2
More than 30 days	72	9.7	28	5.5	218	8.1
Average length of stay						
Mean (SD)	16.9(23.8)		12.0(11.8)		13.6(14.0)	
Median	11		8		9	
75% percentile	20		14		16	
90% percentile	30		24		28	

¹ Includes behavioral health hospitalizations for adults aged 19-64 with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS hospitalizations include those paid only by MassHealth.

Table 31. Hospitalizations for Substance Use Disorders, by Length of Stay and Health Plan, for Adult FFS, MCO, and PCCP Members, FY 2010

Length of Stay	FFS¹		MCOs¹		PCCP¹	
	(N = 657)		(N = 920)		(N = 1,921)	
	N	%	N	%	N	%
Days per hospitalization						
1-7 day,	431	65.6	727	79.0	1690	88.0
8-14 days	178	27.1	163	17.7	207	10.8
15-21 days	27	4.1	23	2.5	18	0.9
22-30 days	16	2.4	4	0.4	3	0.2
More than 30 days	5	0.8	3	0.3	3	0.2
Average length of stay						
Mean (SD)	7.3(5.7)		6.0(12.6)		4.2(3.3)	
Median	6		5		3	
75% percentile	9		7		6	
90% percentile	13		10		8	

¹ Includes behavioral health hospitalizations for adults aged 19-64 with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS hospitalizations include those paid only by MassHealth.

Appendix D.2 Hospital Readmission, Health Plan, and Principal Diagnosis

Table 32. Hospital Readmissions for Anxiety Disorders, by Length of Stay and Health Plan, for Adult FFS, MCO, and PCCP Members, FY 2010

Readmissions	FFS ¹ (N = 58)		MCOs ¹ (N = 191)		PCCP ¹ (N = 271)	
	N	%	N	%	N	%
Total (cumulative)						
Within 30 days	6	10.3	16	8.4	45	16.6
Within 60 days	6	10.3	23	12.0	55	20.3
Within 90 days	8	13.8	30	15.7	66	24.4
Days between discharge and readmission						
1-7	1	1.7	11	5.8	19	7.0
8-14	1	1.7	2	1.1	9	3.3
15-30	4	6.9	3	1.6	17	6.3
31-60	0	0.0	7	3.7	10	3.7
61-90	2	3.5	7	3.7	11	4.1
>90	4	6.9	16	8.4	31	11.4
No readmission	46	79.3	145	75.9	174	64.2

¹ Includes behavioral health hospitalizations for adults aged 19-64 with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS hospitalizations include those paid only by MassHealth.

Table 33. Hospital Readmissions for Bipolar Disorders, by Length of Stay and Health Plan, for Adult FFS, MCO, and PCCP Members, FY 2010

Readmissions	FFS ¹ (N = 438)		MCOs ¹ (N = 894)		PCCP ¹ (N = 2,345)	
	N	%	N	%	N	%
Total (cumulative)						
Within 30 days	57	13.0	133	14.9	406	17.3
Within 60 days	77	17.6	168	18.8	534	22.8
Within 90 days	88	20.1	195	21.8	609	26.0
Days between discharge and readmission						
1-7	19	4.4	53	5.9	160	6.8
8-14	15	3.4	31	3.5	107	4.6
15-30	23	5.3	49	5.5	139	5.9
31-60	20	4.6	35	3.9	128	5.5
61-90	11	2.5	27	3.0	75	3.2
>90	29	6.6	62	6.9	226	9.7
No readmission	320	73.2	637	71.3	1506	64.3

¹ Includes behavioral health hospitalizations for adults aged 19-64 with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS hospitalizations include those paid only by MassHealth.

Table 34. Hospital Readmissions for Depressive Disorders, by Length of Stay and Health Plan, for Adult FFS, MCO, and PCCP Members, FY 2010

Readmissions	FFS ¹ (N = 382)		MCOs ¹ (N = 1,004)		PCCP ¹ (N = 1,817)	
	N	%	N	%	N	%
Total (cumulative)						
Within 30 days	34	8.9	102	10.2	278	15.3
Within 60 days	47	12.3	142	14.1	354	19.5
Within 90 days	56	14.7	161	16.0	408	22.5
Days between discharge and readmission						
1-7	13	3.4	43	4.3	132	7.3
8-14	10	2.6	22	2.2	60	3.3
15-30	11	2.9	37	3.7	86	4.7
31-60	13	3.4	40	4.0	76	4.2
61-90	9	2.4	19	1.9	54	3.0
>90	23	6.0	64	6.4	138	7.6
No readmission	303	79.3	779	77.6	1,269	69.9

¹ Includes behavioral health hospitalizations for adults aged 19-64 with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS hospitalizations include those paid only by MassHealth.

Table 35. Hospital Readmissions for Schizophrenia and Other Psychotic Disorders, by Length of Stay and Health Plan, for Adult FFS, MCO, and PCCP Members, FY 2010

Readmissions	FFS ¹ (N = 454)		MCOs ¹ (N = 295)		PCCP ¹ (N = 1,324)	
	N	%	N	%	N	%
Total (cumulative)						
Within 30 days	78	17.2	45	15.3	300	22.7
Within 60 days	102	22.5	66	22.4	389	29.4
Within 90 days	117	25.8	76	25.8	444	33.5
Days between discharge and readmission						
1-7	30	6.6	21	7.1	136	10.4
8-14	17	3.7	11	3.7	60	4.6
15-30	31	6.8	13	4.4	104	7.9
31-60	24	5.3	21	7.1	89	6.8
61-90	15	3.3	10	3.4	55	4.2
>90	31	6.8	28	9.5	132	10.1
No readmission	306	67.4	191	64.8	737	56.1

¹ Includes behavioral health hospitalizations for adults aged 19-64 with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS hospitalizations include those paid only by MassHealth.

Table 36. Hospital Readmissions for Substance Use Disorders, by Length of Stay and Health Plan, for Adult FFS, MCO, and PCCP Members, FY 2010

Readmissions	FFS ¹ (N = 430)		MCOs ¹ (N = 624)		PCCP ¹ (N = 1,064)	
	N	%	N	%	N	%
Total (cumulative)						
Within 30 days	48	11.2	53	8.5	158	14.9
Within 60 days	63	14.7	76	12.2	237	22.3
Within 90 days	77	17.9	97	15.5	278	26.1
Days between discharge and readmission						
1-7	10	2.3	27	4.3	64	6.0
8-14	18	4.2	8	1.3	45	4.2
15-30	20	4.7	18	2.9	49	4.6
31-60	15	3.5	23	3.7	79	7.4
61-90	14	3.3	21	3.4	41	3.9
>90	18	4.2	30	4.8	83	7.8
No readmission	335	77.9	497	79.7	703	66.1

¹ Includes behavioral health hospitalizations for adults aged 19-64 with discharge dates in FY 2010 and admission dates in FY 2009 or FY 2010. FFS hospitalizations include those paid only by MassHealth.

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